JC17 Rec'd PCT/PTO 21 JUN 2001

FORM-PTO-1390
(Rev. 12-29-99)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER
032287-022

U S APPLICATION NO (If known, see 37 C F R 1 5)
UNASSIGNED 09/868783

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/AT99/00312	21 December 1999	22 December 1998

TITLE OF INVENTION
CIRCUIT AND METHOD FOR REMOTE FEEDING

APPLICANT(S) FOR DO/EO/US
Peter KOVARIK, Günther STADLBAUER and Franz HASELSTEINER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and the PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☒ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:

International Preliminary Examination Report, Unexecuted Declaration

JC18 Rec'd PCT/PTO 21 JUN 2001

U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.50) UNASSIGNED 09/868783	INTERNATIONAL APPLICATION NO PCT/AT99/00312	ATTORNEY'S DOCKET NUMBER 032287-022

17. ☒ The following fees are submitted:				CALCULATIONS	PTO USE ONLY
Basic National Fee (37 CFR 1.492(a)(1)-(5)):					
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO $1,000.00 (960)					
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO $860.00 (970)					
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO $710.00 (958)					
International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) $690.00 (956)					
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) $100.00 (962)					
ENTER APPROPRIATE BASIC FEE AMOUNT =				$ 860.00	
Surcharge of **$130.00 (154)** for furnishing the oath or declaration later than 20 ☐ 30 ☐ months from the earliest claimed priority date (37 CFR 1.492(e)).				$ -0-	
Claims	Number Filed	Number Extra	Rate		
Total Claims	57 -20 =	37	X$18.00 (966)	$ 666.00	
Independent Claims	6 -3 =	3	X$80.00 (964)	$ 240.00	
Multiple dependent claim(s) (if applicable)			+$270.00 (968)	$ -0-	
TOTAL OF ABOVE CALCULATIONS =				$	
Reduction for 1/2 for filing by small entity, if applicable (see below).				$ -0-	-
SUBTOTAL =				$	
Processing fee of **$130.00 (156)** for furnishing the English translation later than 20 ☐ 30 ☐ months from the earliest claimed priority date (37 CFR 1.492(f)). +				$ -0-	
TOTAL NATIONAL FEE =				$ 1766.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00 (581)** per property +				$ -0-	
TOTAL FEES ENCLOSED =				$ 1766.00	
				Amount to be: refunded	$
				charged	$

a. ☐ Small entity status is hereby claimed.

b. ☒ A check in the amount of $ 1766.00 to cover the above fees is enclosed.

c. ☐ Please charge my Deposit Account No. 02-4800 in the amount of $_______ to cover the above fees. A duplicate copy of this sheet is enclosed.

d. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-4800. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Ronald L. Grudziecki, Esq.
BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

SIGNATURE

Kenneth B. Leffler
NAME

36,075
REGISTRATION NUMBER

09/868783

JC18 Rec'd PCT/PTO 21 JUN 2001

Patent

Attorney's Docket No. 032287-022

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	
Peter KOVARIK et al.	Group Art Unit: UNASSIGNED
Application No.: UNASSIGNED	Examiner: UNASSIGNED
Filed: June 21, 2001	
For: CIRCUIT AND METHOD FOR REMOTE FEEDING	

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE CLAIMS:

Please replace claims 1 - 42 as follows:

1. (Amended) Process for remote feeding of a local component connected via a transmission line to the exchange component of an out-of-area switching device of an information transmission system, to which several subscriber lines are connected, whereby the local component is remote-fed with a remote feeding voltage source provided in the exchange component, by means of which the subscriber terminals connected to the subscriber lines are supplied preferably by way of subscriber interfaces, wherein the power consumption of the local component is measured on an ongoing basis and the power remote-fed via the subscriber lines is reduced when a predeterminable limit value of the power consumption is exceeded at least for a portion of the activated or active subscriber terminals.

2. (Amended) Process as claimed in Claim 1, wherein the power consumption of the local component is measured continuously by the remote feeding current flowing thereinto via the transmission line.

3. (Amended) Process as claimed in Claim 2, wherein when a predeterminable remote feeding current is exceeded depending on the current activity status of the subscriber terminals , the voltage applied to the subscriber terminals for maintaining these status or impressed current is reduced by a predeterminable value.

4. (Amended) Process as claimed in Claim 3, wherein when the respective subscriber terminal is in the active status the subscriber feeding voltage and/or the subscriber feeding current is reduced.

5. (Amended) Process as claimed in Claim 3, wherein the call voltage and/or the call current is reduced in the call status of the respective subscriber terminal .

6. (Amended) Process as claimed in Claim 1, wherein the remote-fed power is reduced gradually, whereby after each stage of the power reduction the power consumption of the local component compared to the predeterminable limit value and such reduction is terminated if the limit values is exceeded.

7. (Amended) Process as claimed in Claim 1, wherein the remote-fed power is reduced directly by way of a closed analog regulation loop.

8. (Amended) Information transmission system having an exchange component, a remote feeding voltage source, a local component remote-fed via a transmission line and subscriber terminals connected to the local component via subscriber lines and with interposition of subscriber interfaces, wherein a device for determining the power consumption and a device for reducing the remote-fed power of the subscriber terminals

are provided in the local component, and wherein the reducing device can be controlled by means of a control unit connected to the device for determining the power consumption.

9. (Amended) Information transmission system as claimed in Claim 8, wherein the device for determining power consumption is formed by a current meter for measuring the remote feeding current.

10. (Amended) Information transmission system as claimed in Claim 9, wherein the device for reducing the remote-fed power of the subscriber terminals is formed by a device for reducing the subscriber feeding voltage and/or the subscriber current.

11. (Amended) Information transmission system as claimed in Claim 9, wherein the device for reducing the remote-fed power of the subscriber terminals is formed by a device for reducing the call voltage and/or the call current.

12. (Amended) Information transmission system as claimed in Claim 8, wherein the device for reducing the remote-fed power comprises a digital regulation loop.

13. (Amended) Information transmission system as claimed in Claim 8, wherein the device for reducing the remote-fed power comprises an analog regulation loop.

14. (Amended) Process for remote feeding of a local component connected via a transmission line to the exchange component of an out-of-field device of an information transmission system, to which several subscriber terminals are connected via subscriber lines, whereby the local component is remote-fed with a remote feeding voltage source provided in the exchange component, wherein the current operating status of the subscriber lines in the exchange component or in the local component are detected on an ongoing basis and a remote feeding voltage is assigned to the detected operating status respectively, which corresponds to the current power requirement of the remote-fed local component and

the connected subscriber lines, and in that the remote feeding voltage source is adjusted to the assigned voltage value.

15. (Amended) Process as claimed in Claim 14, wherein respectively several operating conditions of the subscriber lines are combined into one group to which a remote feeding voltage is assigned.

16. (Amended) Process as claimed in Claim 14, wherein the remote feeding voltage is switched by means of a transfer function in the transition from one operating status to the next.

17. (Amended) Process as claimed in Claim 14, wherein the remote feeding voltage is increased or decreased depending on the number of subscribers in identical voltage steps, whereby a voltage step which is higher relative to the identical voltage steps is provided in the transition from a standby status to a subscriber or vice versa.

18. (Amended) Information transmission system having an exchange component of an out-of-field device, a remote feeding voltage source, a local component, remote-fed via a transmission line, to which subscriber terminals are connected, whereby the exchange component or the local component has at least one detector for detecting the operating status of the subscriber lines and the exchange component is connected to the local component via a data transmission unit, wherein the remote feeding voltage source can be remote controlled in its output voltage, whereby the remote feeding voltage source is connected to the control input of a control unit, which control unit is connected to the output of the at least one detector for detecting the operating status in the exchange component and to the data transmission unit.

19. (Amended) Circuit configuration system as claimed in Claim 18, having a direct-current converter, preferably comprising a transducer-transformer, which converts the voltage of a remote feeding voltage source switchable in the exchange component to the

transmission line and thus feeds the subscriber terminals connected to the local component, whereby provided in the local component is a monitoring device, with which the current power requirement of the local component and of the subscriber terminals connected thereto can be established, and whereby the remote feeding voltage source in the exchange component can be controlled by the monitoring device depending on the established power requirement by means of a transmission device connected to the transmission line and the feeding voltage required for the current power requirement can be adjusted in the exchange component, wherein a buffer condenser can be switched by a controllable switch to the supply input of the direct-current converter, whereby at least one of the terminals of the buffer condenser is connected by way of a booster branch containing a rectifier-element, with interposition of another rectifier element if required, to one of the cables of the transmission line, and in that a control output of the transmission device is connected to the control input of the controllable switch, whereby the voltage on the buffer condenser is constantly monitored and the buffer condenser is charged in the exchange component by the remote feeding voltage source in the event of a power loss.

20. (Amended) Circuit configuration as claimed in Claim 19, wherein the supply input of the direct-current converter is connected via at least one rectifier element to the cables of the transmission line.

21. (Amended) Circuit configuration as claimed in Claim 19, wherein the booster branch is formed by series switching of a rectifier-element and a resistor.

22. (Amended) Circuit configuration as claimed in Claim 19, wherein the controllable switch is formed by a FET.

23. (Amended) Circuit configuration as claimed in Claim 19, wherein the terminals of the buffer condenser are connected to the inputs of a voltage comparator, whose output is connected to the transmission unit, by way of which the voltage of the feeding voltage source in the exchange component can be adjusted to a higher charge

voltage, whereby when a lower comparator voltage threshold is undershot by the buffer condenser voltage the feeding voltage source is set to a higher charge voltage, and when an upper comparator voltage threshold is exceeded the feeding voltage source is reset to its previously adjusted value.

24. (Amended) Circuit configuration as claimed in Claim 23, wherein the voltage on the buffer condenser is constantly monitored and in the event of a loss of charge the buffer condenser is charged by the remote feeding voltage source in the exchange component until such time as the higher charge voltage on the buffer condenser is reached and when the higher charge voltage is reached the remote feeding voltage is reset to its previously adjusted value, and in that the power requirement of the subscriber terminals fed by the local component is measured continuously and when there is insufficient power supply on the local component the controllable switch is closed and the buffer condenser is switched to the supply input of the direct-current converter, so that this emits its charge to the direct-current converter, whereby the feeding voltage is increased at the same time, as it corresponds to the current power requirement.

25. (Amended) Process for remote feeding of a local component connected via a transmission line to the exchange component of an out-of-area device of an information transmission system, to which one or more subscriber terminals are connected for example via subscriber lines, whereby the local component or the exchange component is either the feeding divider or the divider to be fed and vice versa, and whereby the divider to be fed is remote-fed with a remote feeding voltage source provided in the feeding divider, wherein the power consumption of the local component to be fed and the power loss in the transmission line are determined in a testing step in the feeding exchange component and from this the specific resistance between the feeding exchange component and the local component to be fed is calculated with a known power requirement of the local component to be fed, and that depending on the calculated specific resistance and the operating status of the divider to be fed the required remote feeding voltage is determined and the remote feeding voltage source is adjusted to the corresponding value.

26. (Amended) Process as claimed in Claim 25, wherein the divider to be fed is the local component and the feeding divider is the exchange component, whereby the power consumption of the local component to be fed is established by determining the number of active subscribers.

27. (Amended) Process as claimed in Claim 26, wherein the determined and adjusted remote feeding voltage is increased or decreased depending on the operating conditions of the subscriber lines or the subscriber terminals.

28. (Amended) Process as claimed in Claim 27, wherein the remote feeding voltage is increased or decreased in stages depending on the number of subscribers, whereby a voltage step is provided which is higher relative to the preferably identical voltage steps in the transition from a standby status to a status with an active subscriber or vice versa.

29. (Amended) Process as claimed in Claim 28, wherein increase or decrease by a voltage step occurs with an increase or decrease in the active number of subscribers by a presettable number of subscribers.

30. (Amended) Process as claimed in Claim 29, wherein the divider to be fed is the exchange component and the feeding divider is the local component, whereby the operating status of the exchange component to be fed is determined and transmitted via the transmission line to the feeding local component.

31. (Amended) Process as claimed in Claim 29, wherein the detected and adjusted remote feeding voltage is increased or decreased depending on the operating status of the exchange component.

32. (Amended) Process as claimed in Claim 31, wherein the remote feeding voltage is increased or decreased in stages depending on the operating status of the exchange component.

33. (Amended) Process as claimed in Claim 1, wherein the detected value of the remote feeding voltage is conveyed to a variable-gain amplifier as an ideal value, with which the remote feeding voltage source is regulated.

34. (Amended) Process as claimed in Claim 1, wherein the remote feeding voltage is switched by means of a transfer function during transition from one operating status to the next.

35. (Amended) Process as claimed in Claim 1, wherein the test step is performed respectively at the commencement of operation while the remote feeding voltage runs up.

36. (Amended) Process as claimed in Claim 1, wherein the different voltage steps are adjusted by an analog or digital regulating process.

37. (Amended) Process as claimed in Claim 36, wherein the different voltage steps are adjusted by means of a digital potentiometer.

38. (Amended) Process as claimed in Claim 1, wherein the calculated values of the specific resistance are stored and can be accessed via a maintenance device.

39. (Amended) Information transmission system with a feeding divider which comprises a remote feeding voltage source, and having a divider to be fed via a transmission line, whereby the remote feeding voltage source can be controlled by a control device in its output voltage, and whereby a meter, preferably a current meter, is provided for determining the power consumption of the divider to be fed and the transmission line and the output of the meter is connected to the control device, wherein

the feeding divider or the divider to be fed respectively has at least one detector for detecting the operating status of the subscriber lines or the subscriber terminals, and the feeding divider is connected to the divider to be fed by a data transmission unit, and that preferably the output of the at least one detector or the data transmission unit is connected to the control unit.

40. (Amended) Transmission system as claimed in Claim 39, wherein the feeding divider is the exchange component and the divider to be fed is the local component.

41. (Amended) Transmission system as claimed in Claim 40, wherein the feeding divider is the local component and the divider to be fed is the exchange component.

42. (Amended) Transmission system as claimed in Claim 39, wherein the control unit is connected to a maintenance device, in which the calculated values of the specific resistance are stored and can be accessed.

Please add new claims 43-57.

43. (New) Process as claimed in Claim 8, wherein the detected value of the remote feeding voltage is conveyed to a variable-gain amplifier as an ideal value, with which the remote feeding voltage source is regulated.

44. (New) Process as claimed in Claim 14, wherein the detected value of the remote feeding voltage is conveyed to a variable-gain amplifier as an ideal value, with which the remote feeding voltage source is regulated.

45. (New) Process as claimed in Claim 18, wherein the detected value of the remote feeding voltage is conveyed to a variable-gain amplifier as an ideal value, with which the remote feeding voltage source is regulated.

46. (Amended) Process as claimed in Claim 8, wherein the remote feeding voltage is switched by means of a transfer function during transition from one operating status to the next.

47. (Amended) Process as claimed in Claim 14, wherein the remote feeding voltage is switched by means of a transfer function during transition from one operating status to the next.

48. (Amended) Process as claimed in Claim 18, wherein the remote feeding voltage is switched by means of a transfer function during transition from one operating status to the next.

49. (Amended) Process as claimed in Claim 8, wherein the test step is performed respectively at the commencement of operation while the remote feeding voltage runs up.

50. (Amended) Process as claimed in Claim 14, wherein the test step is performed respectively at the commencement of operation while the remote feeding voltage runs up.

51. (Amended) Process as claimed in Claim 18, wherein the test step is performed respectively at the commencement of operation while the remote feeding voltage runs up.

52. (Amended) Process as claimed in Claim 8, wherein the different voltage steps are adjusted by an analog or digital regulating process.

53. (Amended) Process as claimed in Claim 14, wherein the different voltage steps are adjusted by an analog or digital regulating process.

54. (Amended) Process as claimed in Claim 18, wherein the different voltage steps are adjusted by an analog or digital regulating process.

55. (Amended) Process as claimed in Claim 8, wherein the calculated values of the specific resistance are stored and can be accessed via a maintenance device.

56. (Amended) Process as claimed in Claim 14, wherein the calculated values of the specific resistance are stored and can be accessed via a maintenance device.

57. (Amended) Process as claimed in Claim 18, wherein the calculated values of the specific resistance are stored and can be accessed via a maintenance device.

REMARKS

The above changes to the claims have been made to delete multiple dependency of the claims, to round out the scope of patent protection being sought, and generally to place the claims in better condition for examination on the merits.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: Kenneth B. Leffler
Registration No. 36,075

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

Date: June 21, 2001

Attachment to Amendment dated June 21, 2001

Marked-up claims 1-42

1. (Amended) Process for remote feeding of a local component [(120)] connected via a transmission line [(101,102)] to the exchange component [(110)] of an out-of-area switching device of an information transmission system, to which several subscriber lines [(131)] are connected, whereby the local component [(120)] is remote-fed with a remote feeding voltage source provided in the exchange component [(110)], by means of which the subscriber terminals [(104, 105, 106, 107)] connected to the subscriber lines [(131)] are supplied preferably by way of subscriber interfaces, [characterised in that] wherein the power consumption of the local component [(120)] is measured on an ongoing basis and the power remote-fed via the subscriber lines [(131)] is reduced when a predeterminable limit value of the power consumption is exceeded at least for a portion of the activated or active subscriber terminals [(104, 105, 106, 107)][,].

2. (Amended) Process as claimed in Claim 1, [characterised in that] wherein the power consumption of the local component [(120)] is measured continuously by the remote feeding current flowing thereinto via the transmission line [(101, 102)].

3. (Amended) Process as claimed in Claim 2, [characterised in that] wherein when a predeterminable remote feeding current is exceeded depending on the current activity status of the subscriber terminals [(104, 105, 106, 107)], the voltage applied to the subscriber terminals [(104, 105, 106, 107)] for maintaining these status or impressed current is reduced by a predeterminable value.

4. (Amended) Process as claimed in Claim 3, [characterised in that] wherein when the respective subscriber terminal [(104, 105, 106, 107)] is in the active status the subscriber feeding voltage and/or the subscriber feeding current is reduced.

5. (Amended) Process as claimed in Claim 3 [or 4, characterised in that], wherein the call voltage and/or the call current is reduced in the call status of the respective subscriber terminal [(104, 105, 106, 107)].

6. (Amended) Process as claimed in [any one of Claims 1 to 5, characterised in that] Claim 1, wherein the remote-fed power is reduced gradually, whereby after each stage of the power reduction the power consumption of the local component [(120)] compared to the predeterminable limit value and such reduction is terminated if the limit values is exceeded.

7. (Amended) Process as claimed in [any one of Claims 1 to 6, characterised in that] Claim 1, wherein the remote-fed power is reduced directly by way of a closed analog regulation loop.

8. (Amended) Information transmission system having an exchange component [(110)], a remote feeding voltage source, a local component [(120)] remote-fed via a transmission line and subscriber terminals [(104, 105, 106, 107)] connected to the local component [(120)] via subscriber lines [(131)] and with interposition of subscriber interfaces, [characterised in that] wherein a device for determining the power consumption [(123)] and a device [(122)] for reducing the remote-fed power of the subscriber terminals [(104, 105, 106, 107)] are provided in the local component [(120)], and [in that] wherein the reducing device [(122)] can be controlled by means of a control unit [(124)] connected to the device for determining the power consumption [(123)].

9. (Amended) Information transmission system as claimed in Claim 8, [characterised in that] wherein the device for determining power consumption is formed by a current meter [(123)] for measuring the remote feeding current.

10. (Amended) Information transmission system as claimed in Claim 9 [or 10], [characterised in that] wherein the device for reducing the remote-fed power of the

subscriber terminals [(104, 105, 106, 107)] is formed by a device for reducing the subscriber feeding voltage and/or the subscriber current [(122)].

11. (Amended) Information transmission system as claimed in Claim 9[or 10], [characterised in that] wherein the device for reducing the remote-fed power of the subscriber terminals [(104, 105, 106, 107)] is formed by a device for reducing the call voltage and/or the call current [(122)].

12. (Amended) Information transmission system as claimed in [any one of Claims 8 to 11, characterised in that] Claim 8, wherein the device for reducing the remote-fed power comprises a digital regulation loop.

13. (Amended) Information transmission system as claimed in [any one of Claims 8 to 12, characterised in that] Claim 8, wherein the device for reducing the remote-fed power comprises an analog regulation loop.

14. (Amended) Process for remote feeding of a local component [(210, 120)] connected via a transmission line [(71', 72')] to the exchange component [(200, 110)] of an out-of-field device of an information transmission system, to which several subscriber terminals [(104, 105, 106, 107)] are connected via subscriber lines [(220)], whereby the local component [(210)] is remote-fed with a remote feeding voltage source provided in the exchange component [(200, 110)], [characterised in that] wherein the current operating status of the subscriber lines [(220)] in the exchange component [(200)] or in the local component [(210)] are detected on an ongoing basis and a remote feeding voltage is assigned to the detected operating status respectively, which corresponds to the current power requirement of the remote-fed local component [(210)] and the connected subscriber lines [(220)], and in that the remote feeding voltage source is adjusted to the assigned voltage value.

15. (Amended) Process as claimed in Claim 14, [characterised in that] wherein respectively several operating conditions of the subscriber lines [(220)] are combined into one group to which a remote feeding voltage is assigned.

16. (Amended) Process as claimed in Claim 14 [or 15, characterised in that] wherein the remote feeding voltage is switched by means of a transfer function in the transition from one operating status to the next.

17. (Amended) Process as claimed in Claim 14, [15 or 16, characterised in that] wherein the remote feeding voltage is increased or decreased depending on the number of subscribers in identical voltage steps, whereby a voltage step which is higher relative to the identical voltage steps is provided in the transition from a standby status to a subscriber or vice versa.

18. (Amended) Information transmission system having an exchange component [(200, 110)] of an out-of-field device, a remote feeding voltage source, a local component [(210, 120)], remote-fed via a transmission line, to which subscriber terminals [(104, 105, 106, 107)] are connected, whereby the exchange component [(200, 110)] or the local component [(210, 120)] has at least one detector for detecting the operating status of the subscriber lines and the exchange component [(200, 110)] is connected to the local component [(210, 120)] via a data transmission unit, [characterised in that] wherein the remote feeding voltage source can be remote controlled in its output voltage, whereby the remote feeding voltage source is connected to the control input of a control unit, which control unit is connected to the output of the at least one detector for detecting the operating status in the exchange component and to the data transmission unit.

19. (Amended) Circuit configuration system as claimed in Claim 18, having a direct-current converter, preferably comprising a transducer-transformer, which converts the voltage of a remote feeding voltage source switchable in the exchange component [(20)] to the transmission line [(1', 2')] and thus feeds the subscriber terminals connected to the

local component [(21)], whereby provided in the local component [(21)] is a monitoring device [(23)], with which the current power requirement of the local component [(21)] and of the subscriber terminals connected thereto can be established, and whereby the remote feeding voltage source in the exchange component [(20)] can be controlled by the monitoring device [(23)] depending on the established power requirement by means of a transmission device [(24)] connected to the transmission line [(1', 2')] and the feeding voltage required for the current power requirement can be adjusted in the exchange component [(22)], [characterised in that] wherein a buffer condenser [(12)] can be switched by a controllable switch [(13)] to the supply input of the direct-current converter [(14)], whereby at least one of the terminals of the buffer condenser [(12)] is connected by way of a booster branch [(7, 8)] containing a rectifier-element [(7)], with interposition of another rectifier element [(3)] if required, to one of the cables of the transmission line [(1', 2')], and in that a control output of the transmission device [(23)] is connected to the control input of the controllable switch [(13)], whereby the voltage on the buffer condenser [(12)] is constantly monitored and the buffer condenser [(12)] is charged in the exchange component [(20)] by the remote feeding voltage source in the event of a power loss.

20. (Amended) Circuit configuration as claimed in Claim 19, [characterised in that] wherein the supply input of the direct-current converter [(14)] is connected via at least one rectifier element [(9)] to the cables of the transmission line [(1', 2')].

21. (Amended) Circuit configuration as claimed in Claim 19 [or 20, characterised in that] wherein the booster branch is formed by series switching of a rectifier-element [(7)] and a resistor [(8)].

22. (Amended) Circuit configuration as claimed in [any one of Claims 19, 20 or 21, characterised in that] Claim 19, wherein the controllable switch is formed by a FET [(13)].

23. (Amended) Circuit configuration as claimed in [any one of Claims 19 to 22, characterised in that] Claim 19, wherein the terminals of the buffer condenser [(12)] are connected to the inputs of a voltage comparator, whose output is connected to the transmission unit, by way of which the voltage of the feeding voltage source in the exchange component can be adjusted to a higher charge voltage, whereby when a lower comparator voltage threshold is undershot by the buffer condenser voltage the feeding voltage source is set to a higher charge voltage, and when an upper comparator voltage threshold is exceeded the feeding voltage source is reset to its previously adjusted value.

24. (Amended) Circuit configuration as claimed in Claim 23, [characterised in that] wherein the voltage on the buffer condenser [(12)] is constantly monitored and in the event of a loss of charge the buffer condenser [(12)] is charged by the remote feeding voltage source in the exchange component [(20)] until such time as the higher charge voltage on the buffer condenser [(12)] is reached and when the higher charge voltage is reached the remote feeding voltage is reset to its previously adjusted value, and in that the power requirement of the subscriber terminals fed by the local component [(21)] is measured continuously and when there is insufficient power supply on the local component [(21)] the controllable switch [(13)] is closed and the buffer condenser [(12)] is switched to the supply input of the direct-current converter [(14)], so that this emits its charge to the direct-current converter [(14)], whereby the feeding voltage is increased at the same time, as it corresponds to the current power requirement.

25. (Amended) Process for remote feeding of a local component [(201)] connected via a transmission line to the exchange component [(206)] of an out-of-area device of an information transmission system, to which one or more subscriber terminals are connected for example via subscriber lines, whereby the local component [(201)] or the exchange component [(206)] is either the feeding divider or the divider to be fed and vice versa, and whereby the divider to be fed is remote-fed with a remote feeding voltage source provided in the feeding divider, [characterised in that] wherein the power consumption of the local component [(201)] to be fed and the power loss in the transmission line [(202)] are

determined in a testing step in the feeding exchange component [(206)] and from this the specific resistance between the feeding exchange component [(206)] and the local component [(201)] to be fed is calculated with a known power requirement of the local component [(201)] to be fed, and that depending on the calculated specific resistance and the operating status of the divider [(201)] to be fed the required remote feeding voltage is determined and the remote feeding voltage source [(205)] is adjusted to the corresponding value.

26. (Amended) Process as claimed in Claim 25, [characterised in that] wherein the divider to be fed is the local component [(201)] and the feeding divider is the exchange component [(206)], whereby the power consumption of the local component to be fed [(201)] is established by determining the number of active subscribers.

27. (Amended) Process as claimed in Claim 26, [characterised in that die] wherein the determined and adjusted remote feeding voltage is increased or decreased depending on the operating conditions of the subscriber lines or the subscriber terminals.

28. (Amended) Process as claimed in Claim 27, [characterised in that] wherein the remote feeding voltage is increased or decreased in stages depending on the number of subscribers, whereby a voltage step is provided which is higher relative to the preferably identical voltage steps in the transition from a standby status to a status with an active subscriber or vice versa.

29. (Amended) Process as claimed in Claim 28, [characterised in that] wherein increase or decrease by a voltage step occurs with an increase or decrease in the active number of subscribers by a presettable number of subscribers.

30. (Amended) Process as claimed in Claim 29, [characterised in that] wherein the divider to be fed is the exchange component and the feeding divider is the local component,

whereby the operating status of the exchange component to be fed is determined and transmitted via the transmission line to the feeding local component.

31. (Amended) Process as claimed in Claim 29, [characterised in that] wherein the detected and adjusted remote feeding voltage is increased or decreased depending on the operating status of the exchange component.

32. (Amended) Process as claimed in Claim 31, [characterised in that] wherein the remote feeding voltage is increased or decreased in stages depending on the operating status of the exchange component.

33. (Amended) Process as claimed in [any one of the foregoing claims, characterised in that] Claim 1, wherein the detected value of the remote feeding voltage is conveyed to a variable-gain amplifier as an ideal value, with which the remote feeding voltage source [(205)] is regulated.

34. (Amended) Process as claimed in [any one of the foregoing claims, characterised in that] Claim 1, wherein the remote feeding voltage is switched by means of a transfer function during transition from one operating status to the next.

35. (Amended) Process as claimed in [any one of the foregoing claims, characterised in that] Claim 1, wherein the test step is performed respectively at the commencement of operation while the remote feeding voltage runs up.

36. (Amended) Process as claimed in [any one of the foregoing claims, characterised in that] Claim 1, wherein the different voltage steps are adjusted by an analog or digital regulating process.

37. (Amended) Process as claimed in Claim 36, [characterised in that] wherein the different voltage steps are adjusted by means of a digital potentiometer.

38. (Amended) Process as claimed in [any one of the foregoing claims, characterised in that] Claim 1, wherein the calculated values of the specific resistance are stored and can be accessed via a maintenance device [(10)].

39. (Amended) Information transmission system with a feeding divider which comprises a remote feeding voltage source [(206)], and having a divider to be fed via a transmission line [(202)], whereby the remote feeding voltage source [(205)] can be controlled by a control device [(207)] in its output voltage, and whereby a meter [(208)], preferably a current meter, is provided for determining the power consumption of the divider [(201)] to be fed and the transmission line [(202)] and the output of the meter [(208)] is connected to the control device [(207)], [characterised in that] wherein the feeding divider [(206)] or the divider [(201)] to be fed respectively has at least one detector for detecting the operating status of the subscriber lines or the subscriber terminals, and the feeding divider [(206)] is connected to the divider [(201)] to be fed by a data transmission unit, and that preferably the output of the at least one detector or the data transmission unit is connected to the control unit [(207)].

40. (Amended) Transmission system as claimed in Claim 39, [characterised in that] wherein the feeding divider is the exchange component [(206)] and the divider to be fed is the local component [(201)].

41. (Amended) Transmission system as claimed in Claim 40, [characterised in that] wherein the feeding divider is the local component and the divider to be fed is the exchange component.

42. (Amended) Transmission system as claimed in Claim 39, [40 or 41, characterised in that] wherein the control unit [(207)] is connected to a maintenance device [(210)], in which the calculated values of the specific resistance are stored and can be accessed.

09/868783
JC18 Rec'd PCT/PTO 21 JUN 2001

CIRCUIT CONFIGURATION AND PROCESS FOR REMOTE FEEDING

The present invention relates to a circuit configuration for remote feeding of a local component which is connected to the exchange component of an out-of-area switching device via a transmission line, having a direct-current converter, preferably comprising a transducer-transformer, which converts the voltage of a remote feeding voltage source which can be connected in the exchange component to the transmission line and thus feeds subscriber terminals connected to the local component.

Remote feeding of subscribers is a technology which has been known for quite some time for enabling feed of telephone terminals independent of local actualities. Currently, with out-of-area switching devices a local component is fed from the exchange component with a constant remote feeding voltage which is selected such that with maximum line length and maximum local component load by subscribers sufficient power is available to the local component for all subscribers to be supplied simultaneously. The out-of-area switching devices which can be used within the scope of the invention are not restricted to speech transmission applications, rather they can also be configured for data transmissions of any type.

The remote feeding voltage in current pair-gain systems is in the vicinity of approximately 120 V (DC). For security reasons and in the interests of achieving the lowest possible cable load the aim is to use the lowest possible remote feeding voltage in the magnitude of approximately 60 V (DC). However, subscribers cannot be adequately supplied with these voltage values during peak periods.

The aim of the invention is therefore to provide a circuit configuration of the type described at the outset, with which on the one hand supply can be guaranteed with a low remote feeding voltage and on the other hand adequate power can be provided quickly for all subscribers during peak periods.

In order to prevent interference to data transmission by switching procedures from one voltage value to the other, a change is usually made to the voltage which is arranged chronologically such that it is encumbered with few harmonic waves, for example, a sinusoidal transmission function is selected which takes into consideration a correspondingly long time. An undersupply of the local component can occur during this transmission period.

Another object of the invention comprises undertaking constant adaptation of the remote feeding voltage to the respectively current power requirement, whereby the supply is always to be guaranteed without interruption during the resulting transmission times between two different voltage values of the remote feeding voltage source.

According to the present invention this is accomplished by the fact that the local component is provided with a monitoring device, with which the current power requirement of the local component and the subscriber terminals connected thereto can be determined, and that the remote feeding voltage source in the exchange component can be controlled by the monitoring device depending on the power requirement as determined by means of a transmission device connected to the transmission line.

In this way the remote feeding voltage can be adapted to the current power requirement, by which this can be kept to relatively low values during an average operating status.

In the event of heavy subscriber activity the remote feeding voltage must be increased accordingly, which is arranged by acknowledgement by means of the transmission device.

In order to transfer the remote feeding voltage of an operating status with a low number of active subscribers to a similar operating status with a high number of subscribers, readjustment times of the remote feeding voltage source have to be taken into consideration, whereby interim power bottlenecks can occur, such that supply to all subscribers and the local component including local component control is jeopardised. In particular, in the event of rapid changes in the remote feeding voltage on the transmission line harmonic waves occur, the effect of which can be to interfere with data transmission. Accordingly, changes in supply voltage must be handled in a way which is as free as possible of harmonic waves, resulting in a correspondingly longer transmission time between two voltage values.

For this reason alone reactions cannot be made as fast as possible to changes in power requirements, resulting in supply outages.

Such hindrances to supply can be avoided according to an embodiment of the invention, in that a buffer condenser can be switched to the feed input of the direct-current converter by means of a controllable switch, whereby at least one of the connections of the buffer condenser is connected to one of the cable leads of the transmission line by a boost branch containing a rectifier-element, by interconnection of another rectifier-element if required, and in that a control output of the monitoring device is connected to the control input of the controllable switch. The required power can therefore be applied to the current power

requirement during adapting of the remote feeding voltage by means of the charge stored in the buffer condenser.

In a further development of the invention it can be provided that the feed input of the direct-current converter is connected to the cable leads of the transmission line via at least one rectifier-element. This effectively prevents the discharge of the buffer condenser by other circuit components of the circuit configuration according to the present invention by applying the buffer condenser to the supply input of the direct-current converter.

The boost branch is preferably formed from series connection of a rectifier-element and a resistor, such that one charging current only can flow via this branch into the buffer condenser.

The controllable switch for connecting the buffer condenser with the supply input of the transducer-transformer can be formed by a FET, resulting in highly efficient control of the buffer condenser.

In accordance with another characteristic of the invention the connections of the buffer condenser can be connected to the inputs of a voltage comparator whose output is connected to the transmission unit, by means of which the voltage of the feeding voltage source in the exchange component can be adjusted to a higher charge voltage, whereby the feeding voltage source is set to a higher load voltage by the buffer condenser voltage whenever a lower comparator voltage threshold is fallen short of and accordingly whenever an upper comparator voltage threshold is exceeded a previously adjusted value is reverted to.

In this way the voltage on the buffer condenser can be monitored ongoing and for an adequate charge of same can be supplied.

In a process for remote feeding of several subscriber terminals using a circuit arrangement according to the present invention, it can be provided according to a further embodiment of the invention that the power requirement of the subscriber terminals connected to the local component is constantly determined, and that the feeding voltage required for the current power requirement is set in the exchange component, whereby the respectively required feeding voltage is established in advance according to the typical operating cases. In this way the remote feeding voltage appropriate for each operating case can be set.

In a further developmental design of the invention it can be provided that the voltage on the buffer condenser is constantly monitored and that in the event of a charge loss the buffer condenser is charged by the remote feeding voltage source in the exchange component, until such time as the higher charge voltage is reached on the buffer condenser and the remote feeding voltage is reset to its previously adjusted value when the higher charge voltage is reached, and that the power requirement of the subscriber terminals supplied by the local component is measured constantly and the controllable switch is closed in the presence of inadequate power supply by the local component and the buffer condenser is switched to the supply input of the direct-current converter, so that the latter sends a majority of its charge to the direct-current converter, whereby the feeding voltage is increased at the same time, as it corresponds to the current power requirement.

In this way the buffer condenser is automatically recharged, thus resulting in the buffer condenser being adequately charged after long pauses in conversation.

The invention also relates to a process for remote feeding of a local component connected to the exchange component of an out-of-area switching device of a message transmission system via a transmission line, to which several subscriber lines are connected, whereby the local component is remote fed with a remote feeding voltage source of the local component provided in the exchange component.

For security reasons the current flow over the transmission line is restricted with 60 mA. This corresponds to that value borne by a person in good health without residual injury. At the same time the feeding voltage is independent of the current power consumption of the local component which is determined essentially by the operating status of the subscriber line, for example disconnected status, cleared status and ringing status.

Constantly increasing ranges and higher data rates are achieved by technical development of data pumps, for example with HDSL data transmission. Higher data rates enable more and more subscribers to be combined on one two-wire circuit. Closely associated with this is an increase in the power requirement of each subscriber as well as an increase in the feed range, resulting in a significant, permanent increase of the remote feeding voltage.

Whereas the first out-of-area switching devices exhibit feeding voltages of typically +-60V, with current pair-gain systems these are in the range between approximately +-130 V and approximately +-180 V, and also higher.

A disadvantage of this tendency to higher and higher feeding voltages is the defective insulation voltage strength of the affected wire pairs.

Whereas there is already experience based on the long history of telephony on the duration of telephone lines when operating with standard official feeding voltages of typically 48 V to 60V, these tolerate remote feeding voltages which are more than four times as high. Because of the minimal insulation thickness of the wire cables problems with insulation can arise with consequential damage to the cables.

Apart from instances of disturbance determined by insulation the high feeding voltages pose a risk for assembly staff when it connects the local component to the transmission line or carries out shunting work.

A growing number of post administrations has decided to request the lowest possible remote feeding voltage from the manufacturers of these remote feeding systems.

Scaling down of the remote feeding voltage, however, can result in bottlenecks in subscriber supply, whenever a certain number of active subscribers is exceeded at peak periods.

The object of the invention is therefore to propose a process of the type described at the outset, which guarantees the supply of a remote feeding voltage capable of being adapted to current ratios and with which sufficient power is made available to all subscribers at peak periods.

Another object of the invention comprises enabling a smooth handling with available resources, for example, existing two-wire circuits, which in terms of a slogan can be adapted as "change copper to gold".

Finally, yet another object of the invention comprises enabling adequate personnel protection within remote-fed information transmission systems.

This is accomplished according to the present invention by the fact that the current operating status of the subscriber lines in the exchange component or in the local component is detected on an ongoing basis and a remote feeding voltage is assigned to the detected operating status, which corresponds to the current power requirement of the remote-fed local component and the connected subscriber lines, and that this is adjusted to the assigned voltage value.

In this way the power consumption of the local component is determined for the most part by the operating status, essentially "disconnected status", "cleared status" and "ringing status", of the subscriber lines. Based on the probability that subscriber lines are busy only a partial number of subscribers is active in remote-fed systems on a time average. In these operating statuses the process according to the present invention enables reduction of the remote feeding voltage over extended periods, for example during night hours. It can be assumed that the full remote feeding voltage is used in rare cases only. When the process according to the present invention is applied the result is a reduction in the electrical charge of the cable insulation. The maximum remote feeding voltage is applied only when necessary. The result therefrom is less corrosion in uninsulated components of the installation.

Better protection for the maintenance and assembly personnel from electric shock is also achievable. When the system is first installed the remote feeding voltage is accordingly turned down for the purpose of excluding risk to assembly personnel. A further advantage is the availability of a reduced susceptance to failure, since a property of the gas-filled overvoltage suppressors used in conventional automatic exchanges is to ignite with rapid transients under the static ignition voltage. All the more so the more the spark gap is biased by direct current. In practical operation this behaviour leads to a temporary outage of the transmission route, as synchronisation has to be rebuilt without it being necessary for reasons of overvoltage protection.

In a further development of the invention it can be provided that several operating conditions of the subscriber lines are combined into one group to which one remote feeding voltage is assigned.

In many countries power consumption of the local component is approximately identical for calling and feeding, where the number of distinguishable cases in a system with N subscribers is then N+1.

According to another embodiment of the invention the remote feeding voltage can be switched by means of a transfer function with transition from one operating status to the next.

To prevent interference to data transmission by change-over procedures of the remote feeding voltage source from one voltage value to another, a change is usually made in the voltage which is arranged over time such that it is encumbered with few harmonic waves; for example, a transfer function is selected which takes the correspondingly long time into account.

According to another embodiment of the invention the remote feeding voltage can be increased or decreased depending on the number of subscribers in identical voltage steps, whereby in the change-over from standby to a subscriber or vice versa a higher voltage step is made available with respect to identical voltage steps.

The higher voltage step therefore occurs because different circuit parts of the remote feed are deactivated in no-load or stand-by.

The present invention also relates to an information transmission system having an exchange component, a remote feeding voltage source, a local component remote-fed by a transmission line, whereby the exchange component or the local component respectively has at least one detector for detecting the operating statuses of the subscriber lines and the exchange component is connected to the local component by way of a data transmission unit.

The aim is to propose such a transmission system with adequate personnel protection and minimal, average voltage charge of the transmission line.

According to the present invention this is achieved by the remote feeding voltage source being remote-controlled in its output voltage, whereby the remote feeding voltage source is connected to the control input of a control unit which is connected to the output of at least one detector for detecting the operating statuses in the exchange component and to the data transmission unit.

Detectors already present for detection of different operating conditions can be used in the exchange component or in the local component, whereby the operating conditions established in the local component are transferred via the data transmission unit to the exchange component. Based on the control capacity of the remote feeding voltage source this can be adapted to the respective power requirement. For average subscriber activities a far lower remote feeding voltage is required than for feeding peak subscriber activities.

The invention therefore relates to a process for remote feeding of a local component connected by way of a transmission line to the exchange component of an out-of-area switching device of an information transmission system, to which several subscriber lines are connected, whereby the local component is remote-fed with a remote feeding voltage source provided in the exchange component, by means of which the subscriber terminals connected to the subscriber lines preferably by way of subscriber interfaces are supplied.

Remote feeding has multiple application with pair-gain systems for example, which make two or more subscriber channels available to a single two-wire transmission line by way of signal-multiplex devices, which is why multiplexing of the subscriber terminals is possible. The connection between the individual subscribers and the transmission line is made by way of a local component of an out-of-area switching device designed for these purposes, which makes the call voltage and the loop current available for various activity states of the individual subscribers. There is a different power requirement depending on the type of activity status of the subscriber terminal, for example disconnected, cleared, ringing or other.

The local component is usually supplied by the exchange component of the out-of-area switching device with a constant remote feeding voltage, such that with maximum wire length of the transmission line and the subscriber lines as well as maximum local component load by subscribers sufficient power is made available to the local component, so that all subscribers can be supplies simultaneously. The applications which can be utilised within the scope of the invention are not restricted to speech transmission applications, but can also be configured for data transmission of any kind.

The remote feeding voltage in current pair-gain systems ranges between approximately 120 V (DC) and approximately 360 V (DC). As already stated, the current flow over the transmission line is limited to 60 mA for safety reasons.

The remote feeding voltage is kept constant on the subscriber lines independently of the operating status and the load conditions. It must also be selected such that with maximum power requirement from all subscribers being connected to the local component the device is fully functional. It is for this reason that the remote feeding voltage often reaches very high values.

The object of the invention is therefore to propose a process of the type described hereinabove, ensuring a drop in the remote feeding voltage and thus a constant uninterruptible supply to subscribers.

This is accomplished according to the present invention in that the power consumption of the local component is measured on an ongoing basis and if a preset limit value of the power consumption is exceeded at least for a portion of the activated or active subscriber terminals the power remote-fed over the subscriber lines is decreased.

The status of the individual subscriber terminals is determined strongly by the speech habits of the individual subscribers, though there is no way it can be anticipated, so that for a

majority of the operating time there is an average charge which is far below a theoretical maximum charge which would result with maximum transmission line length, maximum subscriber line length for all subscribers and simultaneous activation of all subscribers.

Accordingly, the remote feeding voltage for an average load of the local component can be configured by subscribers and thus according to the present invention with an increase in activity, made remarkable by increase of the power consumption of the local component, the remote-fed power for activated or active subscriber terminals can be decreased. This is supported by the circumstance where a plurality of functions of modern subscriber terminals can be driven with clearly lower outputs than specified by the network operators, because the latter have to adjust their specifications according to the small number of old terminals still in use.

In a further development of the invention the power consumption of the local component can be measured on an ongoing basis by the remote feed current flowing thereinto via the transmission line, such that the power consumption can be established exactly on condition of a constant remote feeding voltage by means of this current measuring.

According to yet another further development of the invention when a presettable remote feeding current is exceeded, depending on the current activity conditions of the subscriber terminals, a reduction in the voltage or impressed current applied to the subscriber terminals for maintaining these conditions can be made by a presettable value. If said reduction for each activated or active subscriber is made by a relatively small amount, then this decrease doe not hamper the functionality of the individual subscriber terminals, rather overall it enables reduction of the power required for the remote-fed subscribers.

According to another characteristic of the invention in the disconnected status of the respective subscriber terminal subscriber feeding voltage and/or the subscriber feeding current can be reduced or, in a further development of the invention, in the calling status of the respective subscriber terminal the call voltage and/or the call current can be reduced. Thereby, extraordinary activity conditions, which for brief periods produce an increased overall power requirement, arising during operation of the information transmission system according to the present invention can be bypassed with uniform, relatively low remote feeding voltage, without risk to the supply to subscribers.

And finally, according to another development of the invention the remote-fed power can be reduced gradually, whereby the power consumption of the local component is compared to

the presettable limit value following every stage of the power reduction and the reduction is ended as soon as the limit value is exceeded.

Through the gradual decrease of the remote-fed power, which can be carried out either as analog or digital, the power consumption of the local component can be reliably adapted to the limit value required for stable supply.

According to another variant of the invention the remote-fed power can be reduced gradually by way of a closed analog regulation loop. This can be achieved with relatively low circuit-related expenditure.

The invention additionally relates to an information transmission system having an exchange component, a remote feeding voltage source, a local component remote-fed by way of a transmission line and subscriber terminals connected to the local component via subscriber lines and with interposition of subscriber interfaces.

The object is to propose an information transmission system as mentioned hereinabove which can be operated with a relatively low remote feeding voltage and which ensures supply to all subscribers even when there is a very high or maximum activity rate of subscribers.

This is accomplished according to the present invention by the fact that a device for determining the power consumption and a device for reducing the remote-fed power of the subscriber terminals are provided in the local component, and the device for reduction can be controlled by way of a control unit connected to the device for determining the power consumption.

The power absorbed by the local component and forwarded to the subscriber terminals is constantly being monitored by the device provided for determining power consumption. The measured values are compared to a previously given limit value and as soon as this is exceeded the device for reducing the remote-fed power makes a reduction in the power available for the subscriber terminals, so that in spite of very high activity all subscribers are able to continue operating unhindered.

According to a further development of the invention the device for determining power consumption can be formed by a current meter for measuring the remote feeding current. Power consumption can be detected precisely and reliably by measuring the remote feeding current.

In a further arrangement of the invention the device for reducing the remote-fed power of the subscriber terminals can be formed by a device for reducing the subscriber feeding voltage and/or the subscriber current.

A slight reduction in the feeding voltage or the feeding current results in lower power consumption, but fails to impede functioning of the subscriber terminals, as long as it is inside the permitted limit value.

According to yet another variant of the invention the device for reducing remote-fed power of the subscriber terminals can be formed by a device for reducing the calling voltage and/or the calling current.

In this way there follows a reduction in the remote-fed power by a call alarm operated with diminished voltage or diminished current, which is why in most cases there is only a minimal change in the call signal, as low limit values of the calling voltage or of the calling current are provided with customary devices of this type which are partly considerably under the nominal values, so that these low limit values enable a reliable function with less power consumption.

Furthermore, in a further development of the invention it can be provided that the device for reducing the remote-fed power comprises a digital regulation loop. The advantage of this is that it can be realised in an integrated construction.

The device for reducing the remote-fed power can also comprise an analog regulation loop with minimal circuitry expenditure, by means of which the remote-fed power can be regulated gradually.

The invention also relates to a process for remote feeding of a local component connected to the exchange component of an out-of-area switching device of a message transmission system via a transmission line, to which several subscriber lines are connected, whereby the local component or the exchange component is either the feeding divider or the divider to be fed and vice versa, and whereby divider to be fed is remote fed with a remote feeding voltage source provided in the feeding divider.

A growing number of network operators is now demanding the lowest possible remote feeding voltage from the manufacturers of these remote feeding systems.

A drop in the remote feeding voltage however results in possible bottlenecks in supply to subscribers, if a certain number of active subscribers is exceeded at peak times.

The object of the invention is therefore to propose a process of the type mentioned at the outset, with which the supply is guaranteed with a remote feeding voltage adaptable to the current ratios, and with which adequate power for all subscribers can also be made available at peak load times in the local component or by feeding by the local component in the exchange component.

Another object of the invention comprises enabling smooth handling with available resources, existing two-wire lines, for instance.

This is accomplished according to the present invention in that the power consumption of the divider to be fed and the power loss of the transmission line is monitored in a testing step in the feeding divider and from this when the power requirement of the divider to be fed is known the specific resistance between the feeding divider and the divider to be fed is calculated, and that depending on the calculated specific resistance and the operating status of the divider to be fed the required remote feeding voltage is monitored and the remote feeding voltage source is adjusted to the corresponding value.

In this way the remote feeding voltage can be adjusted to the actual distance between the feeding divider and the divider to be fed and the operating status of the divider to be fed, so that with an average load of the divider to be fed a significant reduction of the remote feeding voltage is adjusted. An essential here is the direct measuring of the actual power consumption, which contributes relatively good precision for monitoring the specific resistance. The specific resistance is the essential value to be monitored to be able to determine the required remote feeding voltage.

In a further arrangement of the invention the divider to be fed can be the local component and the feeding divider can be the exchange component, whereby the power consumption of the local component to be fed is established by monitoring the number of active subscribers. When the power consumption of the subscribers is known a statement on the operating status of the local component can be made by counting the active subscribers.

In accordance with yet another embodiment of the invention the remote feeding voltage adapts to the respective current subscriber activity, in that the monitored and adjusted remote feeding voltage is increased or decreased depending on the operating status of the subscriber lines.

In accordance with another variant of the invention the remote feeding voltage can be increased or decreased in stages depending on the number of subscribers, whereby when the transition is made from standby to a status with an active subscriber or vice versa, a higher voltage step is provided compared to the preferably identical voltage steps. The voltage steps can also be of varying magnitudes in systems with different subscriber operating voltages.

Each increase or decrease in the number of subscribers corresponds to a voltage step by which the remote feeding voltage is increased or decreased. The higher voltage step during transition from standby to active status of a subscriber terminal accordingly occurs because additional circuit components are deactivated in the no-load or standby mode.

In the case of long subscriber lines the effect of the increase or decrease of the number of active subscribers by one or a few subscribers with respect to the power requirement is minimal only. In another arrangement of the invention the increase or decrease can occur by one voltage step with augmenting or decreasing the number of active subscribers by a presettable number of subscribers. In the process the voltage is increased for example only if three more subscribers become active, for example.

According to yet another characteristic of the invention the divider to be fed can be the exchange component and the feeding divider can be the local component, whereby the operating status of the exchange component to be fed is determined and is conveyed via the transmission line to the feeding local component.

Remote feeding of the exchange component can take place with equipment whose essential component is concentrated in the local component, so that the latter is always supplied if the local component is also operating. This can be an advantage with data transmission equipment for example which is located in the local component and where the exchange component no longer has to be operated during outages.

The remote feeding voltage detected and adjusted by the testing step can be increased or decreased in a further development of the invention depending on the operating status of the exchange component, by means of which this is supplied with the appropriate remote feeding voltage, independently of whether it is in standby or in active mode.

In this connection it can also be advantageous that according to another embodiment of the invention the remote feeding voltage is increased or decreased in stages depending on the

operating status of the exchange component. Assigned to each operating status is a precisely defined voltage step.

It can also be provided that the monitored value of the remote feeding voltage is forwarded to a variable-gain amplifier as a nominal value, with which the remote feeding voltage source is controlled. The remote feeding voltage is thereby compared exactly to the monitored nominal value.

There is also the case where the remote feeding voltage is switched by means of a transfer function in transitioning from an operating status to the successive status. In order to prevent interference from data transfers by switching procedures of the remote feeding voltage source from one voltage value to the other, a change in the voltage is generally made which is arranged chronologically such that it is encumbered with few harmonic waves in the transmission frequency range; for example, a suitable transmission function is selected which takes up a correspondingly long time.

An adjustment of the remote feeding voltage to the respective specific resistance between local component and exchange component can be made particularly advantageously, if, according to a further development of the invention, the testing step is taken at start-up while the remote feeding voltage is being run up.

The different voltage steps can be adjusted according to another embodiment of the invention by an analog or digital control procedure, by means of which the remote feeding voltage can be adjusted precisely or in stages.

In a particularly preferred manner the different voltage steps can be adjusted by means of a digital potentiometer.

A further variant of the invention can comprise the fact that the calculated values of the specific resistance are stored and can be called up via a maintenance device. Precedent changes of the specific resistance can be detected and processed statistically over longer periods.

The invention further relates to an information transmission system having a feeding divider which comprises a remote feeding voltage source and a divider to be fed via a transmission line.

As with the process according to the present invention the object is to adapt the remote feeding voltage to the actual length of the transmission line and the operating status in a manner as easy to carry out as possible.

This is accomplished according to the present invention in that the remote feeding voltage source can be controlled by means of a control unit in its output voltage, whereby a meter, preferably a current-measuring instrument, is provided for ascertaining the power consumption of the divider to be fed and the transmission line and the output of the meter is connected to the control unit.

With the assistance of the meter for ascertaining the power consumption a reliable statement can be made on the power loss occurring on the transmission line and therefrom on the specific resistance, by means of which suitable control of the remote feeding voltage source is made possible. The current flowing into the divider to be fed is measured by the current-measuring instrument and the total applied power is ascertained by means of the applied value of the remote feeding voltage, from which the power loss transferred to the line can be calculated again when the power requirement of the divider to be fed is known.

In another variant of the invention the feeding divider can be the exchange component and the divider to be fed can be the local component, which configuration is standard for example for a pair-gain system.

Another variant according to the present invention can comprise the fact that the feeding divider is the local component and the divider to be fed is the exchange component.

This feed originating from the local component can be an advantage for data transmission devices whose most important component is located in the local component, by means of which the exchange component needs to be fed only if the local component is operating.

To be able to establish the respective current operating status, in a further development of the invention the feeding divider or the divider to be fed can respectively exhibit at least one detector for detecting the operating statuses of the subscriber lines, for example, or the subscriber terminals and the feeding divider can be connected to the divider to be fed via a data transmission unit, whereby preferably the output of the at least one detector or the data transmission unit is connected to the control unit.

The changes in activity of the divider to be fed, from which changes a corresponding adjustment of the remote feeding voltage can be derived, are fully monitored.

For statistical acquisition of the specific resistance it can be an advantage if the control unit is connected to a maintenance device in which the calculated values of the specific resistance can be stored and accessed.

The invention will now be explained hereinbelow in greater detail with reference to the embodiments illustrated in the accompanying diagrams, in which:

Figure 1 is a wiring diagram of an information transmission system with an embodiment of the circuit configuration according to the present invention;

Figure 2 is a wiring diagram of another embodiment of the circuit configuration according to the present invention;

Figure 3 is a diagram of the remote feeding voltage modified according to the present invention depending on the number of active subscribers;

Figure 4 is an automated logic diagram of an embodiment of the information transmission system according to the present invention with remote feeding;

Figure 5 is an automated logic diagram of another embodiment of the information transmission system according to the present invention;

Figure 6 is a block flow diagram of another embodiment of the information transmission system according to the present invention;

Figure 7 is a diagram of the remote feeding voltage modified according to the present invention depending on the number of active subscribers;

Figure 8 is an equivalent circuit diagram of the information transmission system according to Figure 6;

Figure 9 is another diagram of the remote feeding voltage modified according to the present invention depending on the operating status of the divider to be fed.

Figure 1 shows a section of an information transmission system with remote feeding, for example of a pair-gain system, whereby an exchange component 20 and a local component 21 of an out-of-area switching device are connected via a transmission line 1', 2'.

In a completely generalised form local component is hereby understood to mean the respectively remote-fed component which contains an analog or digital interface between the transmission line and the subscriber lines. A local component of this form can therefore be realised within the scope of the invention not only in pair-gain systems but also in xDSL or comparable similar systems.

Accordingly, the exchange component is the remote-feeding component which contains respectively an analog or digital exchange interface between the telephone or data switching system and the transmission line. Here, too, the invention can be executed for all forms of known analog or digital exchange components.

In the illustrated example local component 21 remote-feeds N=4 subscriber interfaces, though the number of subscribers N is not subject to any restrictions. The power requirement fluctuates depending on the number of active subscribers. Local component 21 is supplied with a remote feeding voltage via exchange component 20, by which the subscriber terminals connected to the local component are supplied after conversion.

In order to have to maintain only the smallest possible remote feeding voltage on transmission line 1', 2', a monitoring device 23 is provided according to the present invention in local component 21, with which the current power requirement of the local component 21 can be established with the connected subscriber terminals. The remote feeding voltage source located in exchange component 20, not illustrated in Figure 1, can be controlled by monitoring device 23 depending on the established power requirement by means of a transmission device 24 which is for its part connected by way of a dividing mechanism 25 to transmission line 1', 2'. Branching off from dividing mechanism 25 via a transmission line 1,2 is the direct-current feed separated from the data transmission. At the same time the control data can be transmitted via a control channel to transmission line 1', 2', for example.

The power requirement of the subscriber terminals connected to local component 21 is determined on an ongoing basis and the feeding voltage in exchange component 20 required for the current power requirement is adjusted accordingly, whereby the respectively required feeding voltage has been previously determined preferably empirically for all operating cases.

This can happen in the following manner. In the rest state a known resistance Rx is switched to the DSL local component input and when the remote feeding voltage is switched on the loop resistance is measured which is composed of the specific resistance of transmission line 1,2 and the known resistance Rx. The optimum remote feeding voltage for all operating conditions can be calculated from the resulting measurement.

During operation the current power requirement is now transferred to exchange component 20 by way of monitoring device 23 and transmission device 24 and the remote feeding voltage is modified there accordingly. During normal operation therefore a relatively low

remote feeding voltage can be set which is advantageous both in terms of safety and with respect to cable load.

For bypassing rapid fluctuations in load the circuit configuration illustrated in Figure 2 can be utilised which contains, apart from known direct-current converter 14,15, wiring components which briefly make electrical energy available during the interval required for readjusting the remote feeding voltage.

Transmission line 1,2, which corresponds to transmission line 1', 2' until direct-current uncoupling takes place in dividing mechanism 25 as compared to data transmission, is connected to a charging capacitor 10 by way a bridge rectifier comprising four rectifier elements 3, 4, 5, 6. The remote feeding voltage can thus rest on transmission line 1,2 independent of polarity, and if necessary any ripple voltages occurring are smoothed by charging capacitor 10. Condenser 11 prevents high-frequency interference contents. In the embodiment according to Figure 2 the direct-current converter supplied by the remote feeding voltage is formed by a transducer-transformer 14, of which the primary side only is illustrated, and a pulsed switch 15 which scrambles the direct voltage according to its control coefficient. Transducer-transformer 14 converts the voltage of the remote feeding voltage source in exchange component 20 which can be switched to transmission line 1,2 and thus feeds the subscriber terminals connected to local component 21.

A buffer condenser 12 can be switched via a controllable switch 13 to the supply input of direct-current converter 14, whereby one of the terminals of buffer condenser 12 is connected via a booster branch 7, 8 containing a rectifier-element 7 to one of the cables of transmission line 1,2. At the same time a control output of monitoring device 23 is connected to the control input of controllable switch 13.

The briefly required power is removed by corresponding control of switch 13 from buffer condenser 12 which is charged at preset times, for example a subscriber has terminated a conversation or as required. When switch 13, which is formed preferably by a FET (field effect transistor), is closed, the load accumulated in buffer condenser 12 can flow into direct-current converter 14, 15, thereby filling the temporary gap in power.

To prevent the buffer condenser discharging into or reloading in other circuitry components to reduce the attendant power losses, the supply input of direct-current converter 14 is connected by at least one rectifier element 9 to the cables of transmission line 1,2.

The booster branch is formed from a serial circuit of a rectifier element 7 and a resistor 8 which enables charge current in one direction only.

The charging can be set at specific times, for example on completion of a conversation by a subscriber or as required.

For this purpose the terminals of buffer condenser 12 are connected to the inputs of a voltage comparator, not illustrated in Figure 2, whose output is connected to transmission unit 24, by way of which the voltage of the feeding voltage source can be adjusted in the exchange component to a higher load voltage, by means of which buffer condenser 12 can be charged.

In order to equalise the self-discharging of buffer condenser 12, the feeding voltage source is set to a higher charge voltage and thereafter is reset to a previously set value when an upper comparator voltage threshold is exceeded when a lower comparator voltage threshold is succeeded by the buffer condenser voltage. The voltage on buffer condenser 12 is therefore constantly monitored and in the event of a loss of charge buffer condenser 12 is charged by the remote feeding voltage source in the exchange component, whereby the voltage of the feeding voltage source in the exchange component is increased, until the higher charge voltage on buffer condenser 12 is reached, at which point the remote feeding voltage is reset to its previously adjusted value. This is how buffer condenser 12 is charged constantly to a sufficiently high voltage in order to be able to deal with power bottlenecks on demand in the short term.

The remote feeding voltage, which is appropriate for this operating status, is adjusted by acknowledgment sent to the exchange component. If there is considerable increase in subscriber connections within a short period, the outcome is increased power requirement, which the adjusted remote feeding voltage cannot cope with.

The remote feeding voltage in the exchange component can be readjusted however only within a specific period to avoid harmonic waves from originating which would have a disturbing influence on data transmission over the transmission line.

The power requirement of the subscriber terminals fed by the local component is constantly measured and if there is insufficient power supply by local component 21 controllable switch 13 is closed and buffer condenser 12 is switched to the supply input of direct-current converter 14, so that this discharges to direct-current converter 14, at the same time causing an increase in the feeding voltage, as it corresponds to the current power requirement.

During the time when the remote feeding voltage is increased, buffer condenser 12 covers the additional power requirement. Thereafter the feeding voltage which has increased accordingly in the interim takes over complete power supply of all subscribers.

In the reduced state, in which average subscriber activity can be managed, the remote feeding voltage is accordingly between approximately 94 V and approximately 100 V compared to the common remote feeding voltage at the time of typically 166 V to 176V. Transducer-transformer 14 must therefore be defined for a greater input voltage range, for example 60V to 180V.

There is also the possibility of keeping the status of buffer condenser 12 in a constantly charged state after the termination of every conversation by a subscriber and the adjusted value of the remote feeding voltage is retained for a period or until a preset voltage on buffer condenser 12 is reached, so that buffer condenser 12 is fully charged and the remote feeding voltage is then lowered to a reduced value. Buffer condenser 12 is charged to a charging voltage corresponding to a standby value of the remote feeding voltage required for the respective operating status, without the charge corresponding to the subscribers just gone into inactive status. Resetting the remote feeding voltage can be time-controlled or regulated by a comparator.

The drawback to recharging with abovementioned presettable time interval is that the ageing effects of the condenser capacity are not taken into consideration. This can be helped by the present comparator monitors the charging and the recharging process being terminated when the preset voltage value on buffer condenser 12 is exceeded.

Figure 4 shows a section of an information transmission system with remote feeding, for example of a pair-gain system, whereby an exchange component 200 and a local component 210 of an out-of-area switching device are connected by means of a transmission line 71', 72'.

Local component is understood to mean, in generalised form, the remote-fed section which contains an analog or digital interface between the transmission line and the subscriber lines. A local component of this form can therefore be realised within the scope of the invention not only in pair-gain systems but also in xDSL or comparatively similar systems.

Accordingly, the exchange component is the remote-feeding part, in which there is an analog or digital exchange interface located between the telephone or data acquisition system and

the transmission line. In the embodiment according to Figure 4 there is a total of M exchange interfaces provided, for example. With respect also to the exchange component the invention can be carried out for all forms of known analog or digital exchange components.

In the illustrated example N=4 subscriber interfaces are remote-fed by local component 210, and the number of subscribers N is not subject to any restrictions. The power requirement fluctuates depending on the number of active subscribers. Local component 210 is supplied by exchange component 200 with a remote feeding voltage, by means of which the subscriber terminals connected to local component 210 are fed after conversion takes place.

The remote feeding voltage source, not illustrated in Figure 4, located in exchange component 200 is connected to local component 210 by way of transmission line 71', 72'. Data traffic and feeding voltage are separated by a dividing mechanism 250. The feed separated in direct current from the data transmission branches off from dividing mechanism 250 via a transmission line 71, 72.

To have to maintain the smallest possible remote feeding voltage on transmission line 71', 72', the current operating status of subscriber lines 220 in the exchange component 200 or in the local component 210 is continuously detected and a remote feeding voltage, which corresponds to the current power requirement of remote-fed local component 210 and subscriber line 220 connected thereto, is assigned to the detected operating status. Consequently, the remote feeding voltage is adjusted to the assigned value.

Exchange component 200 is connected to local component 210 via a data transmission unit, not illustrated here, by way if which the data can be exchanged between the local component 210 and the exchange component 200. At least one detector for detecting the operating statuses of the subscriber lines is provided in local component 210, which detects a subscriber loop, for example when a subscriber receiver is lifted or put down, and advise the changes in status by way of a data channel of the data transmission unit of exchange component 200, where these are registered.

In already existing exchange components there is also at least one—not illustrated—detector fro detecting the operating statuses of subscriber lines 220, which are utilised for the process according to the present invention.

According to the present invention the output voltage of the remote feeding voltage source can be remote-controlled, whereby the remote feeding voltage source is connected to the control input—not illustrated here—of a control unit which is connected to the output of the at

least one detector for detecting the operating statuses in the exchange component and to the data transmission unit.

The individual operating statuses can be recorded by the already present detectors and the data transmission unit.

In the standby status in which all subscribers are inactive, a standby remote feeding voltage Un is set which guarantees supply of the local component at the farthest distance form exchange component 200. The static current uptake of local component 210 is practically constant.

If a call is fed to a subscriber, then this operating status is detected in the exchange component by the detectors and a specific remote feeding voltage, which corresponds to the respective power requirement of subscriber line 220, is automatically assigned to this operating status, by computer for example,. The increase in the remote feeding voltage is associated with a certain delay period, in particular when the remote feeding voltage is converted by means of a transfer function, for example roll-off sinus, to prevent interference in data transmission during transfer from one operating status to the next.

Because the call feed is already detected in exchange component 200, the remote feeding voltage can still be increased before the actual call is commenced to a value which corresponds to this operating status. This effectively prevents a bower bottleneck from occurring.

When a subscriber lifts the receiver this can be registered in exchange component 200, in that this change of status is detected by detectors provided in local component 210 and transmitted via the data transmission unit to exchange component 200, whereby the feeding current required for the subscriber is made available only after a delay period. This is determined by the fact that the remote feeding voltage assigned to the respective operating status must already be present in the local component at full capacity, and only then is the feed for the made available to the subscriber terminal, whereby in many countries, for example, delays of up to 1s are permissible. This modus operandi is representative of one only of many possibilities in which the current operating status can be detected and the remote feeding voltage can be adjusted correspondingly.

Just as a boost in the remote feeding voltage results from increases in activity, decreases in activity by subscribers likewise lower the remote feeding voltage, resulting in an upwards movement along the voltage graduation as shown in Figure 3.

Since power consumption can be determined for all operating conditions of all subscriber lines 220 as well as operating conditions and is thus known sufficiently precisely, the remote feeding voltage can be controlled according to a gradual response curve depending on the number of active subscribers, as is illustrated in Figure 3 by way of example.

Assigned to every operating status with 0,1,2... 8 active subscribers is a precisely defined voltage value U1, U2,..... U8=Umax. With eight active subscribers the remote feeding voltage has reached its highest value.

In many countries power consumption of the local component is practically identical during calling and feeding, while the number of distinctive cases in one system with N subscribers is N+1, as shown in Figure 3.

This means that several operating conditions of the subscriber lines are combined into one group, to each of which a remote feeding voltage. If subscriber activity proceeds head in leaps and bounds the remote feeding voltage is similarly increased, whereby from time to time several voltage steps are omitted.

The remote feeding voltage can be graduated in any manner at all, such that in simple systems only two or three remote feeding voltage values can be made available, whereby a first value for example can be ascertained for an average load and a second value for a peak load. The level of the individual voltage steps can be set by computer or also empirically.

Consideration must be given to the length of the transmission line in choosing the remote feeding voltage values.

In the embodiment according to Figure 3 the remote feeding voltage is increased or decreased depending on the number of subscribers in equal voltage steps according to the identical power requirement of subscribers, whereby as transition is made from standby to a subscriber or vice versa, a higher voltage step is provided relative to the identical voltage steps, as different circuit components of remote feeding are deactivated in standby.

The block diagram according to Figure 5 illustrates an information transmission system with an out-of-area switching device formed by an exchange component 110 and a local component 120.

ON the exchange side N exchange interfaces 130 are designed whose number can vary at random. In the embodiment according to Figure 5 there is a total of four exchange interfaces.

Local component 120 is connected to exchange component 110 via a transmission line 101, 102, by way of which local component 120 is remote-fed, as is customary for example in pair-gain systems. Also provided in exchange component 110 is a remote feeding voltage source—not illustrated in Figure 5—which exhibits a constant remote feeding voltage and is equipped with a current limit, by means of which the maximum value of the current put out by the remote feeding voltage source is established, 60 mA for example. This corresponds to the usual arrangement of a pair-gain remote feeding system which also can be used for other types of remote feeding systems. In particular, arrangements of this type are utilised not only for speech transmissions but also for data transmissions, for example in xDSL or comparably similar systems.

Local component is generally understood to mean the remote-fed component which contains an analog or digital interface between the transmission line and the subscriber lines.

Consequently, the exchange component is the remote-feeding component in which respectively an analog or digital exchange interface is located between a telephone or data acquisition system and transmission line 101,102.

Originating from local component 120 are N subscriber lines, in the embodiment according to Figure 5 a total of four subscriber lines 131, which are connected via subscriber interfaces 114, 115, 116, 117 to subscriber terminals 104,105,106,107 which are remote fed by way of local component 120. The number N of subscriber lines 131 is respectively greater than 2, but not subject to any restrictions and can be selected at will within the framework of the invention.

Depending on each activity status of subscriber terminals 104,105,106,107 there are different voltages being applied to subscriber lines 131 apart from the speech signal. If a subscriber is to be advised of an incoming call a control logic in local component 120—not shown here—switches the calling voltage to subscriber line 131 in question, which generates a call signal for the subscriber being addressed. As soon as the subscriber lifts the receiver of the subscriber terminal generation of the call signal is interrupted and a subscriber feeding current or loop current is impressed which enables the subscriber terminal to be supplied. Each of these activity conditions produces a certain power consumption which is added to an overall power requirement of all subscribers connected to the local component.

To ensure adequate supply of all connected subscribers the power consumption of the local component must also be sufficient, if all subscriber terminals are being used or if all subscribers receive a call simultaneously or if there is a combination of these conditions, whereby the maximum length of the transmission line or the subscriber lines is assumed.

Above all this means for a larger number of subscribers, as may occur for example with a pair-gain system, a clear decrease of the feeding range or the necessity for a corresponding rise in the remote feeding voltage. The latter, however, cannot be increased arbitrarily for safety reasons and due to problems with material charge or insulation arising with a higher remote feeding voltage.

To be able to use a relatively low remote feeding voltage the present invention provides that the power consumption of local component 120 is constantly measured and the power remote-fed over subscriber lines 131 is reduced at least for a portion of activated or active subscriber terminals 104,105,106, 107 whenever a predeterminable limit value of power consumption is exceeded.

For this purpose, a device 123 for determining power consumption and a device 122 of subscriber terminals 104,105,106,107 are provided in the local component, whereby device 122 for reducing the remote-fed power can be controlled by way of a control unit 124 connected to device 123 for determining power consumption.

In the embodiment according to Figure 5 a current meter 123 for measuring the remote feeding current I is provided as device for determining power consumption, in which the power consumption occurs by continuous measuring of the remote feeding current I flowing via transmission line 101,102 into local component 120.

The power consumption can also be ascertained by some other familiar method.

If a predeterminable value of the remote feeding current I is exceeded, the voltage or impressed current for maintaining this status applied to subscriber terminals 104,105,106,107 is reduced by a presettable value, depending on the current status of subscriber terminals 104,105,106,107.

When respective subscriber terminal 104,105,106, 107 is being used the subscriber feeding voltage or the subscriber feeding voltage (loop current) is reduced and the calling voltage is also reduced when respective subscriber terminal 107 is in calling status. But only one of the

abovementioned measures can be carried out at any one time, for example, only the reduction of the loop current.

Accordingly, the device for reducing the remote-fed power of subscriber terminals 104,105,106,107 can be formed by a device for reducing the subscriber feeding voltage and/or the subscriber current or can be formed by a device for reducing the call voltage and/or the call current. Any combination of these devices is feasible.

At the same time for instance a value of the call voltage given for a call alarm of a subscriber terminal can be reduced by 10% for example. The call function is impaired there by not at all or only slightly. The case can arise where the call alarms ring somewhat more softly during this phase of power reduction, though the full alarm voltage is applied for the predominant operating time when there is average activity only, in spite of relatively low remote feeding voltage.

The remote-fed power can be reduced with use of an analog regulation loop to a predeterminable value which corresponds to the limit value of the power consumption of local component 120.

The power remote-fed over subscriber lines 131 can also be reduced in digital or analog form in stages, whereby the power consumption of local component 120 is compared to the predeterminable limit value after each step of the power reduction and such reduction is terminated when the limit values is exceeded.

By way of example, the abovementioned limit values can be determined by means of a comparator which monitors a drop in voltage proportional to the remote feeding current and announces that a corresponding threshold has been exceeded as exceeding a limit value of power consumption.

The device for reducing the remote-fed power can therefore comprise a digital regulation loop or an analog regulation loop depending on the available circuit environment.

Figure 6 illustrates another embodiment of an information transmission system having an exchange component 206 designed as divider with a number M greater or equal to 1 (1,2,3,....) of exchange interfaces and a local component 201 designed as a divider to be fed with a number N greater or equal to 1 (1,2,3,...) of subscriber interfaces N, to which the subscriber terminals are connected, not shown here. The highest number of active subscriber terminals is therefore N. In the case of broadband data transmissions only a

single subscriber terminal can be provided which is formed by a (N=1) broadband transmission unit which has standby status as well as one only active status. Usually with non-concentrated devices M = N and with concentrated devices N is greater than M.

Exchange component 206 and local component 201 belong to a general out-of-area switching device. In the embodiment according to Figure 6 local component is understood as the respectively remote-fed component which contains an analog or digital interface between the transmission line and the subscriber lines. Such a local component can therefore be realised within the scope of the invention not only in pair-gain systems but also in xDSL or comparably similar systems.

Accordingly, the exchange component according to Figure 6 is the feeding component, in which either an analog or a digital exchange interface is located between the telephone or data acquisition system and the transmission line.

N subscriber interfaces are fed from local component 201, whereby as already mentioned hereinabove the number N can be randomly preset und also N can equal 1. The power requirement fluctuates depending on the number of subscribers N and the number of active subscribers. For its part, local component 201 remote-fed via remote feeding voltage source 205 feeds the subscriber terminals connected hereto, not illustrated in Figure 6.

Remote feeding voltage source 205 can be controlled by a control device 207 in its output voltage, whereby a meter, preferably a current meter 208, is provided for determining the power consumption of local component 201 and transmission line 202 and the output of meter 208 is connected to control device 207.

The current I generated by remote feeding voltage source 205 is measured and evaluated.

According to the present invention on the exchange side the power consumption of local component 201 to be fed and the power loss in transmission line 202 are determined in a testing step in feeding exchange component 206 and from this the specific resistance between feeding exchange component 206 and local component 201 to be fed is calculated with a known power requirement of local component 201 to be fed.

The test step is preferably performed at the commencement of operation during running-up of the remote feeding voltage, but can also occur at other times, should there ever be the need for readjustment.

The local component belonging to an exchange component can already have been measured precisely following manufacture or for some other reason, so that its power requirement can be accepted as known. The actual specific resistance, which will in many cases be under the maximum provided resistance, can be calculated from the measuring results with assistance of the known power requirement.

First of all a test voltage U_p is set which will generally be selected lower than the later adjusted remote feeding voltage. Figure 8 depicts the equivalent circuit for this procedure, by means of which this can be illustrated more clearly.

A test step I_p is measured with current meter 208 and from this specific resistance R_L of the transmission line is calculated. The known power consumption P_R of the divider to be fed, of local component 201, is subtracted from the power fed into transmission line 202 and the specific resistance is calculated from this.

$$R_L = \frac{U_p \cdot I_p - P_R}{I_p^{\,2}} \qquad \text{(Formula 1)}$$

P_R ... Known power consumption of the divider to be fed, in this example of the local component, during the test step.

The required remote feeding voltage is determined and remote feeding voltage source 205 is adjusted to corresponding value U_F depending on the calculated specific resistance R_L and the operating status of the local component 201. The operating status is easily established by way of the number N of active subscriber terminals, though it may be determined in some other way.

$$U_F = U_R + \frac{R_L \cdot \dfrac{P_{St} + P_{R1} + P_{Rx}(N-1)}{\mu_R}}{U_R} \qquad \text{(Formula 2)}$$

U_R .... minimal operating voltage for the local component

P_{St} .... power consumption of the local component in standby

P_{RI} .... maximum power consumption of each first active subscriber terminal (incl. the switching circuits active in the local component)

P_{Rx} ...... maximum power consumption of each other active subscriber terminal

μ_R .... efficiency of the direct-current converter in the local component

N .... number of active subscribers

The determined value of the remote feeding voltage U_F is forwarded as an ideal value to a variable-gain amplifier inside control device 207, with which remote feeding voltage source 205 is regulated to the determined value of the remote feeding voltage. Each analog or digital control process can be used for this. In particular, the different voltage steps can be adjusted by means of a digital potentiometer. The remote feeding voltage can also be adjusted analog.

Should there be a change in subscriber activity, the traced and adjusted remote feeding voltage is increased or decreased depending on the operating conditions of the subscriber lines or the subscriber terminals.

Exchange component 206 or local component 201 each has at least one detector—not illustrated—for detecting the operating statuses of the subscriber lines, whereby exchange component 206 is interconnected to local component 201 via a data transmission unit. The outputs of the at least one detector the data transmission unit are connected to control device 207.

Data can be exchanged between the local component and the exchange component via the data transmission unit. Provided in local component 201 is a detector—not illustrated here—for detecting the operating statuses of the subscriber lines, which detects a subscriber loop for example when a subscriber terminal is picked or put down and advises any changes in status via a data channel of the data transmission unit of exchange component 206, in particular how many such changes were registered.

In existing exchange components there are already such detectors which can therefore be used for the process according to the present invention. The individual operating conditions can be detected by the existing detectors and the data transmission unit.

In standby, when all subscriber terminals are inactive, a standby voltage is set which enables local component 201 to be supplied. The static current uptake of the local component is practically constant.

If a call is now routed to a subscriber its operating status is detected in exchange component 206 by way of the detectors located therein and a certain increase of the remote feeding voltage is allocated automatically to this operating status, such that control device 207 generates a corresponding signal and sends it to remote feeding voltage source 205.

The remote feeding voltage is at the same time increased or decreased in stages depending on the number of subscribers, whereby with transition from standby status to a status with an active subscriber or vice versa a voltage step is provided which is higher relative to the same voltage steps. This results from the switching circuits of the local component deactivated in standby, which come into operation with activation of the first subscriber and accordingly contribute to the power consumption.

With long subscriber lines the remote feeding voltage required for maintaining operation is altered with the additional activation of a single subscriber terminal, but to a minor extent only. It is therefore advantageous to realise such increase or decrease by one voltage step when the active number of subscribers grows or diminishes by a presettable number of subscribers. The remote feeding voltage can be switched one step higher for example as soon as three more subscribers have been activated.

The increase of the remote feeding voltage is associated with a certain delay time, in particular whenever the remote feeding voltage is converted by means of a transfer function, for example roll-off sinus, to prevent interference of the data transmission during transition from one operating status to the next. But since the call feeding is already detected in the exchange component, the remote feeding voltage can still be raised prior to commencement of an actual call to a value corresponding to this operating status. This effectively prevents a power bottleneck from developing.

When a subscriber picks up, this can be registered in the exchange component, in that these status changes are announced by detectors provided in the local component and via the transmission unit to the exchange component, whereby the feeding current required for the subscriber is made available only after a delay.

Such delay is specified by the fact that first the remote feeding voltage assigned to the respective operating status in the local component must already be at its full capacity, and only after the feed for the subscriber terminal is generated. This procedure does, however, postulate one only of many possibilities as to how the current operating status can be detected.

Just as the remote feeding voltage is increased with an upswing in activity, the remote feeding voltage is lowered whenever there is a downturn in subscriber activity. By way of four transmission lines of varying length Figure 7 shows the resulting voltage steps for the remote feeding voltage, whereby an ever-increasing "transposed" voltage base is illustrated showing increasing distance of local component 201 from exchange component 206. The voltage

graduation shown at far left in Figure 7 is adequate for a local component with a short line, whereas the voltage graduation shown at far right exhibits a considerably higher base voltage on account of a longer line, which represents the power loss in the transmission line.

The standby status of local component 201 is characterised by step 0, in which various switching circuits of the local component are deactivated. The increase in activity to the first subscriber (stage 1) is accompanied by an unevenly stronger increase in the remote feeding voltage than is the case with the other stages 2,3,..., X. A precisely defined voltage value U_0, U_1, U_2 ...... U_X is assigned to each operating status with 0,1,2... N active subscribers. In the embodiment according to Figure 7 the remote feeding voltage has reached its highest value with eight active subscribers. The voltage value U_O corresponds to that value which has been adjusted in the standby status by determining the specific resistance with the process according to the present invention.

In many countries the power consumption of the local component is practically the same for calling and for feeding, and the number of different cases for a system with N subscribers is then N+1, as shown in Figure 7. With fluctuating power consumption values a finer division could be made by remote feeding voltage stages.

The remote feeding voltage can be graduated in any manner, so that in simple systems only two or three remote feeding voltage values can be made available, whereby a first value for example can be specified for an average load and a second value can be specified for a peak load.

In the interests of preventing a power undersupply of the local component, a voltage comparator can be provided in the local component, which monitors the lower permitted limit value of the remote feeding voltage and arranges an increase in the remote feeding voltage via the transmission unit when the lower limit values is exceeded.

Figure 9 illustrates an example of a broadband transmission device (N=1) fed by an exchange component, which essentially has only a standby status "0" and an active status "1". As a result there are only two voltage values of the remote feeding voltage to be adjusted. The diagram also shows the voltage values for two different distances between exchange component and local component in order to show the difference between short and long transmission line.

And finally, statistical records on all measuring and computer values can be compiled to be able to monitor age-specific changes to the transmission line. In particular, the calculated

values of the specific resistance can be stored and can be called up via a maintenance device 210.

In the same way, within the scope of the invention the local component can be stipulated as the feeding divider and the exchange component of the out-of-area switching device can be stipulated as the divider to be fed, whereby the operating status of the exchange component to be fed is determined and conveyed via the transmission line to the feeding local component. The remote feeding voltage can then be raised or lowered preferably in stages, depending on the operating status of the exchange component, whereby a voltage step is provided which is higher relative to the same voltage steps in the transition from a standby status to an active status or vice versa.

A broadband data transmission unit is given as an example of a local component, by which the exchange component is remote-fed. This form of remote feeding is given without limiting the general inventive idea, because it is used more frequently, whereas basically pair-gain systems can be fed from the local component, which happens to be more seldom. The exchange component of the broadband transmission unit has for example a switched-off status, a standby status and an active status. The remote feeding voltage is realised in the same manner as described hereinabove. After a test step, in which the power consumption of the transmission line and of the exchange component is established, the specific resistance can be determined (see formula 1) from the known power requirement of the exchange component. The required remote feeding voltage is determined according to the operating status of the exchange component and the remote feeding voltage source of the local component is adjusted to the corresponding value. The divider to be fed, in this example the exchange component, has at the same time a detector for detecting the operating status of the exchange component and the feeding local component is connected to the exchange component to be fed via a data transmission unit, such that the operating status of the exchange component can be announced to the local component hereby.

Claims:

1. A circuit configuration for remote feeding of a local component (21) connected via a transmission line (1', 2') to the exchange component (20) of an out-of-range device of an information transmission system, having a direct-current converter, preferably comprising a transducer-transformer, which converts the voltage of a remote feeding voltage source switchable in the exchange component (20) to the transmission line (1', 2') and thus feeds the subscriber terminals connected to the local component (21), characterised in that provided in the local component (21) is a monitoring device (23), with which the current power requirement of the local component (21) and of the subscriber terminals connected thereto can be established, and in that the remote feeding voltage source in the exchange component (20) can be controlled by the monitoring device (23) depending on the established power requirement by means of a transmission device (24) connected to the transmission line (1', 2').

2. Circuit configuration as claimed in Claim 1, characterised in that a buffer condenser (12) can be switched by a controllable switch (13) to the supply input of the direct-current converter (14), whereby at least one of the terminals of the buffer condenser (12) is connected by way of a booster branch (7, 8) containing a rectifier-element (7), with interposition of another rectifier element (3) if required, to one of the cables of the transmission line (1', 2'), and in that a control output of the transmission device (23) is connected to the control input of the controllable switch (13).

3. Circuit configuration as claimed in Claim 1 or 2, characterised in that the supply input of the direct-current converter (14) is connected via at least one rectifier element (9) to the cables of the transmission line (1', 2').

4. Circuit configuration as claimed in Claim 1,2 or 3, characterised in that the booster branch is formed by series switching of a rectifier-element (7) and a resistor (8).

5. Circuit configuration as claimed in any one of Claims 1 to 4, characterised in that the controllable switch is formed by a FET (13).

6. Circuit configuration as claimed in any one of Claims 1 to 5, characterised in that the terminals of the buffer condenser (12) are connected to the inputs of a voltage comparator, whose output is connected to the transmission unit, by way of which the voltage of the

feeding voltage source in the exchange component can be adjusted to a higher charge voltage, whereby when a lower comparator voltage threshold is undershot by the buffer condenser voltage the feeding voltage source is set to a higher charge voltage, and when an upper comparator voltage threshold is exceeded the feeding voltage source is reset to its previously adjusted value.

7. Process for remote feeding of several subscriber terminals using a circuit configuration as claimed in any one of Claims 1 to 6, characterised in that the power requirement of the subscriber terminals connected to the local component (21) is being established continuously, and in that the feeding voltage in the exchange component (22) required for the current power requirement is adjusted, whereby the respectively required feeding voltage has been previously determined for all operating cases preferably empirically.

8. Process as claimed in Claim 7, characterised in that the voltage on the buffer condenser (12) is constantly monitored and in the event of a loss of charge the buffer condenser (12) is charged by the remote feeding voltage source in the exchange component (20) until such time as the higher charge voltage on the buffer condenser (12) is reached and when the higher charge voltage is reached the remote feeding voltage is reset to its previously adjusted value, and in that the power requirement of the subscriber terminals fed by the local component (21) is measured continuously and when there is insufficient power supply on the local component (21) the controllable switch (13) is closed and the buffer condenser (12) is switched to the supply input of the direct-current converter (14), so that this emits its charge to the direct-current converter (14), whereby the feeding voltage is increased at the same time, as it corresponds to the current power requirement.

9. Process for remote feeding of a local component (210) connected via a transmission line (71', 72') to the exchange component (200) of an out-of-field device of an information transmission system, to which several subscriber lines (220) are connected, whereby the local component (210) is remote-fed with a remote feeding voltage source provided in the exchange component (200), characterised in that the current operating status of the subscriber lines (220) in the exchange component (200) or in the local component (210) are detected on an ongoing basis and a remote feeding voltage is assigned to the detected operating status respectively, which corresponds to the current power requirement of the remote-fed local component (210) and the connected subscriber lines (220), and in that the remote feeding voltage source is adjusted to the assigned voltage value.

10. Process as claimed in Claim 9, characterised in that respectively several operating conditions of the subscriber lines (220) are combined into one group to which a remote feeding voltage is assigned.

11. Process as claimed in Claim 9 or 10, characterised in that the remote feeding voltage is switched by means of a transfer function in the transition from one operating status to the next.

12. Process as claimed in Claim 9,10 or 11, characterised in that the remote feeding voltage is increased or decreased depending on the number of subscribers in identical voltage steps, whereby a voltage step which is higher relative to the identical voltage steps is provided in the transition from a standby status to a subscriber or vice versa.

13. Information transmission system having an exchange component (200), a remote feeding voltage source, a local component (210) remote-fed via a transmission line, whereby the exchange component (200) or the local component (210) has at least one detector for detecting the operating statuses of the subscriber lines and the exchange component (200) is connected to the local component (210) via a data transmission unit, using a process as claimed in any one of the foregoing claims 9 to 12, characterised in that the remote feeding voltage source can be remote-controlled in its output voltage, whereby the remote feeding voltage source is connected to the control input of a control unit, which control unit is connected to the output of the at least one detector for detecting the operating statuses in the exchange component and to the data transmission unit.

14. Process for remote feeding of a local component (120) connected via a transmission line (101,102) to the exchange component (110) of an out-of-area switching device of an information transmission system, to which several subscriber lines (131) are connected, whereby the local component (120) is remote-fed with a remote feeding voltage source provided in the exchange component (110), by means of which the subscriber terminals (107) connected to the subscriber lines (131) are supplied preferably by way of subscriber interfaces, characterised in that the power consumption of the local component (120) is measured on an ongoing basis and the power remote-fed via the subscriber lines (131) is reduced when a predeterminable limit value of the power consumption is exceeded at least for a portion of the activated or active subscriber terminals (107),

15. Process as claimed in Claim 14, characterised in that the power consumption of the local component (120) is measured continuously by the remote feeding current flowing thereinto via the transmission line (101,102).

16. Process as claimed in Claim 15, characterised in that when a predeterminable remote feeding current is exceeded depending on the current activity statuses of the subscriber terminals (107), the voltage applied to the subscriber terminals (107) for maintaining these statuses or impressed current is reduced by a predeterminable value.

17. Process as claimed in Claim 16, characterised in that when the respective subscriber terminal (107) is in the active status the subscriber feeding voltage and/or the subscriber feeding current is reduced.

18. Process as claimed in Claim 16 or 17, characterised in that the call voltage and/or the call current is reduced in the call status of the respective subscriber terminal (104,105,106,107).

19. Process as claimed in any one of Claims 14 to 18, characterised in that the remote-fed power is reduced gradually, whereby after each stage of the power reduction the power consumption of the local component (120) compared to the predeterminable limit value and such reduction is terminated if the limit values is exceeded.

20. Process as claimed in any one of Claims 14 to 19, characterised in that the remote-fed power is reduced directly by way of a closed analog regulation loop.

21. Information transmission system having an exchange component (110), a remote feeding voltage source, a local component (120) remote-fed via a transmission line and subscriber terminals (104,105,106,107) connected to the local component (120) via subscriber lines (131) and with interposition of subscriber interfaces, characterised in that a device for determining the power consumption (123) and a device (122) for reducing the remote-fed power of the subscriber terminals 107) are provided in the local component (120), and in that the reducing device (122) can be controlled by means of a control unit (124) connected to the device for determining the power consumption (123).

22. Information transmission system as claimed in Claim 21, characterised in that the device for determining power consumption is formed by a current meter (123) for measuring the remote feeding current.

23. Information transmission system as claimed in Claim 21 or 22, characterised in that the device for reducing the remote-fed power of the subscriber terminals (104,105,106,107)

is formed by a device for reducing the subscriber feeding voltage and/or the subscriber current (122).

24. Information transmission system as claimed in Claim 21 or 22, characterised in that the device for reducing the remote-fed power of the subscriber terminals (107) is formed by a device for reducing the call voltage and/or the call current (122).

25. Information transmission system as claimed in any one of Claims 21 to 24, characterised in that the device for reducing the remote-fed power comprises a digital regulation loop.

26. Information transmission system as claimed in any one of Claims 21 to 24, characterised in that the device for reducing the remote-fed power comprises an analog regulation loop.

27. Process for remote feeding of a local component (201) connected via a transmission line to the exchange component (206) of an out-of-area device of an information transmission system, to which one or more subscriber terminals are connected for example via subscriber lines, whereby the local component (201) or the exchange component (206) is either the feeding divider or the divider to be fed and vice versa, and whereby the divider to be fed is remote-fed with a remote feeding voltage source provided in the feeding divider, characterised in that the power consumption of the local component (201) to be fed and the power loss in the transmission line (202) are determined in a testing step in the feeding exchange component (206) and from this the specific resistance between the feeding exchange component (206) and the local component (201) to be fed is calculated with a known power requirement of the local component (201) to be fed, and that depending on the calculated specific resistance and the operating status of the divider (201) to be fed the required remote feeding voltage is determined and the remote feeding voltage source (205) is adjusted to the corresponding value.

28. Process as claimed in Claim 27, characterised in that the divider to be fed is the local component (201) and the feeding divider is the exchange component (206), whereby the power consumption of the local component to be fed (201) is established by determining the number of active subscribers.

29. Process as claimed in Claim 28, characterised in that die determined and adjusted remote feeding voltage is increased or decreased depending on the operating conditions of the subscriber lines or the subscriber terminals.

30. Process as claimed in Claim 29, characterised in that the remote feeding voltage is increased or decreased in stages depending on the number of subscribers, whereby a voltage step is provided which is higher relative to the preferably identical voltage steps in the transition from a standby status to a status with an active subscriber or vice versa.

31. Process as claimed in Claim 30, characterised in that increase or decrease by a voltage step occurs with an increase or decrease in the active number of subscribers by a presettable number of subscribers.

32. Process as claimed in Claim 27, characterised in that the divider to be fed is the exchange component and the feeding divider is the local component, whereby the operating status of the exchange component to be fed is determined and transmitted via the transmission line to the feeding local component.

33. Process as claimed in Claim 32, characterised in that the detected and adjusted remote feeding voltage is increased or decreased depending on the operating status of the exchange component.

34. Process as claimed in Claim 33, characterised in that the remote feeding voltage is increased or decreased in stages depending on the operating status of the exchange component.

35. Process as claimed in any one of the foregoing claims, characterised in that the detected value of the remote feeding voltage is conveyed to a variable-gain amplifier as an ideal value, with which the remote feeding voltage source (205) is regulated.

36. Process as claimed in any one of the foregoing claims, characterised in that the remote feeding voltage is switched by means of a transfer function during transition from one operating status to the next.

37. Process as claimed in any one of the foregoing claims, characterised in that the test step is performed respectively at the commencement of operation while the remote feeding voltage runs up.

38. Process as claimed in any cne of the foregoing claims, characterised in that the different voltage steps are adjusted by an analog or digital regulating process.

39. Process as claimed in Claim 38, characterised in that the different voltage steps are adjusted by means of a digital potentiometer.

40. Process as claimed in any one of the foregoing claims, characterised in that the calculated values of the specific resistance are stored and can be accessed via a maintenance device (10).

41. Information transmission system with a feeding divider which comprises a remote feeding voltage source (205), and having a divider to be fed via a transmission line (202), characterised in that the remote feeding voltage source (205) can be controlled by a control device (207) in its output voltage, whereby a meter (208), preferably a current meter, is provided for determining the power consumption of the divider (201) to be fed and the transmission line (202) and the output of the meter (208) is connected to the control device (207).

42. Transmission system as claimed in Claim 41, characterised in that the feeding divider is the exchange component (206) and the divider to be fed is the local component (201).

43. Transmission system as claimed in Claim 41, characterised in that the feeding divider is the local component and the divider to be fed is the exchange component.

44. Transmission system as claimed in Claim 41,42,43, characterised in that the feeding divider (206) or the divider (201) to be fed has at least one detector for detecting the operating statuses, for example of the subscriber lines or the subscriber terminals, and the feeding divider (206) is connected to the divider (201) to be fed by a data transmission unit, and that preferably the output of the at least one detector or the data transmission unit is connected to the control unit (207).

45. Transmission system as claimed in Claim 44, characterised in that the control unit (207) is connected to a maintenance device (210), in which the calculated values of the specific resistance are stored and can be accessed.

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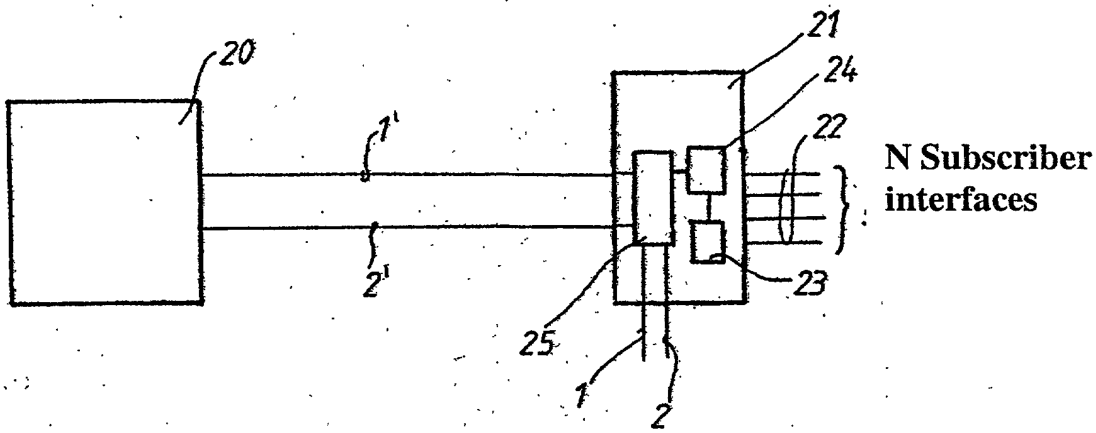

FIG.1

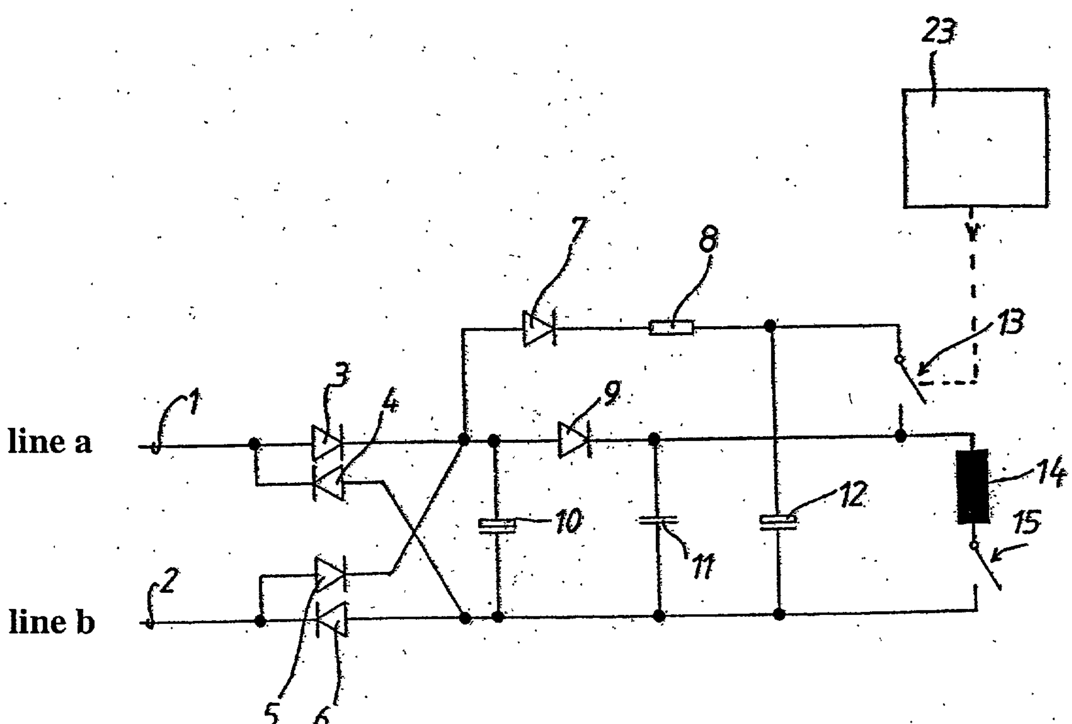

FIG.2

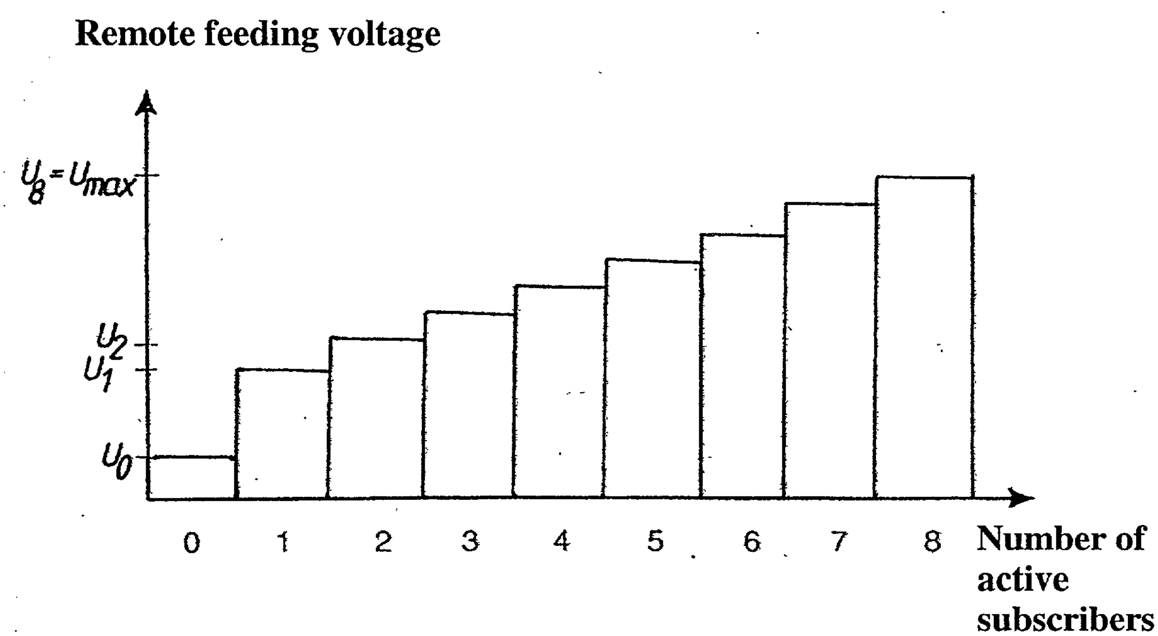
Remote feeding voltage
$U_8 = U_{max}$
U_2
U_1
U_0
0
1
2
3
4
5
6
7
8
Number of active subscribers

FIG.3

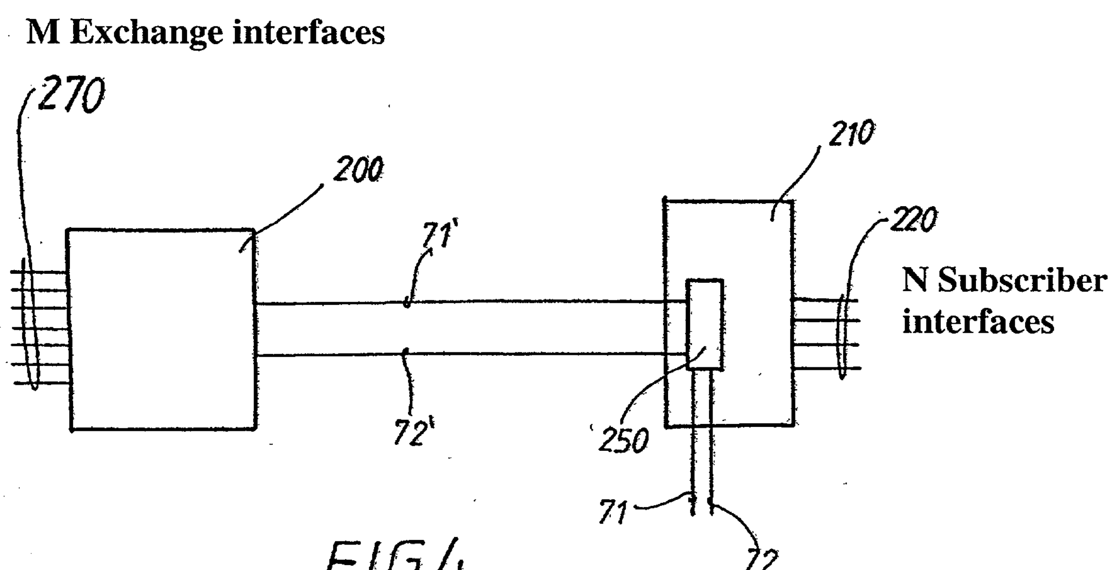
M Exchange interfaces
270
200
71'
72'
210
220
N Subscriber interfaces
250
71
72

FIG.4

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PCT/AT99/00312

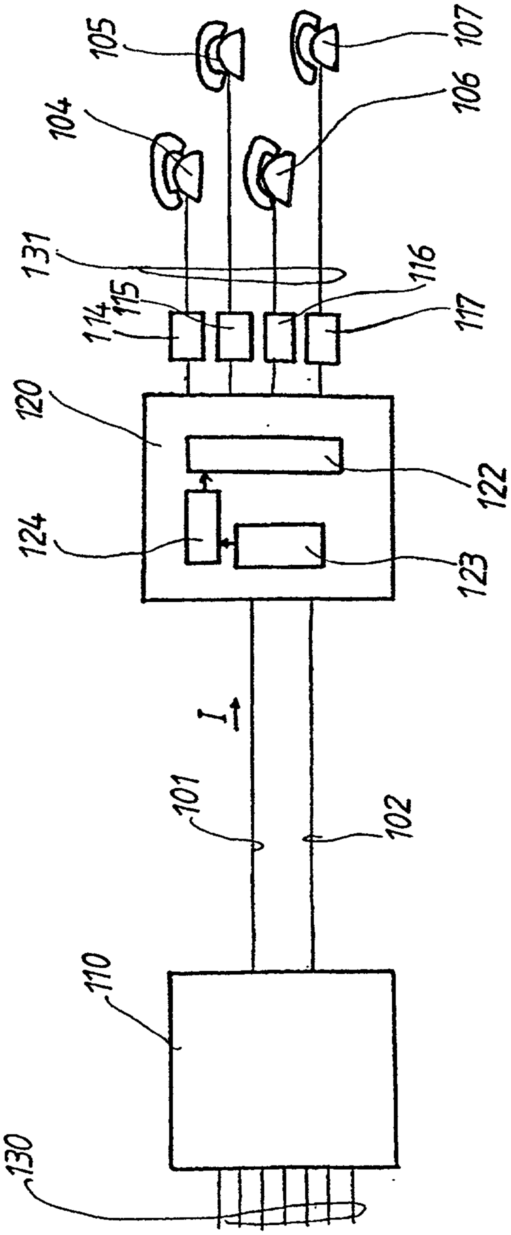

FIG.5

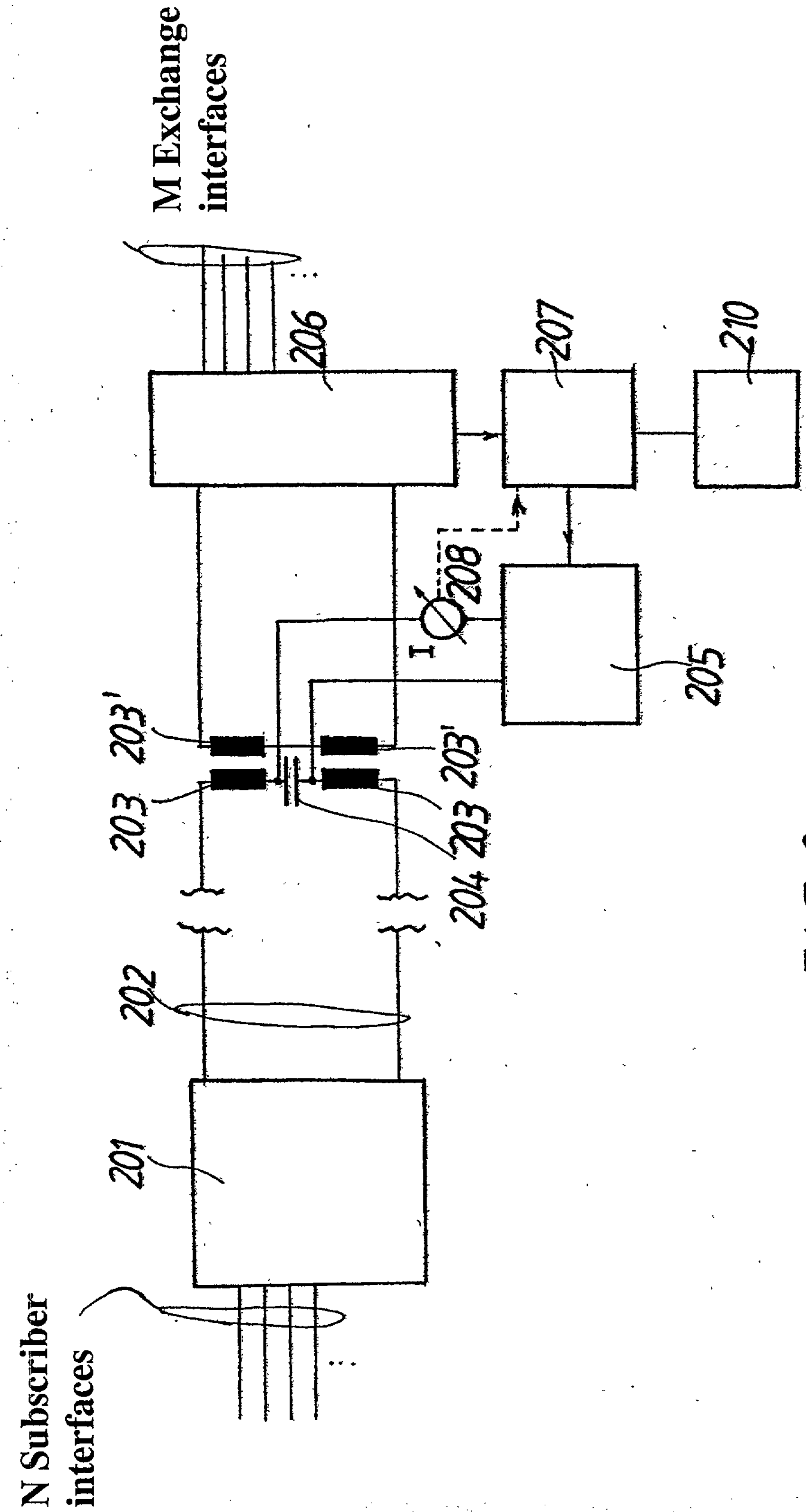
M Exchange interfaces
206
207
210
208
I
205
203'
203'
203
203
204
202
201
N Subscriber interfaces

FIG.6

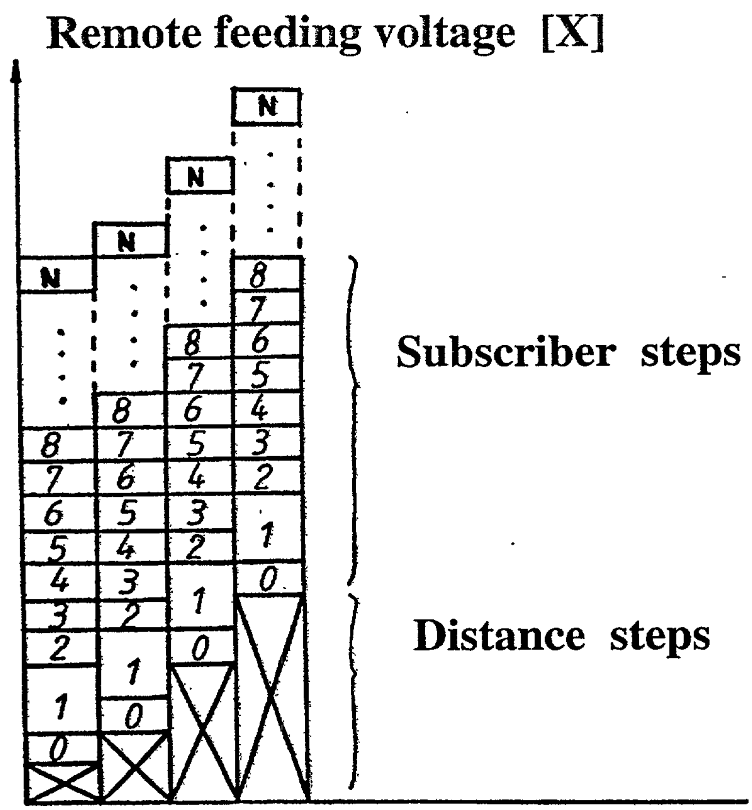
Remote feeding voltage [X]
N
N
N
N
8
7
6
5
4
3
2
1
0
Subscriber steps
Distance steps

FIG.7

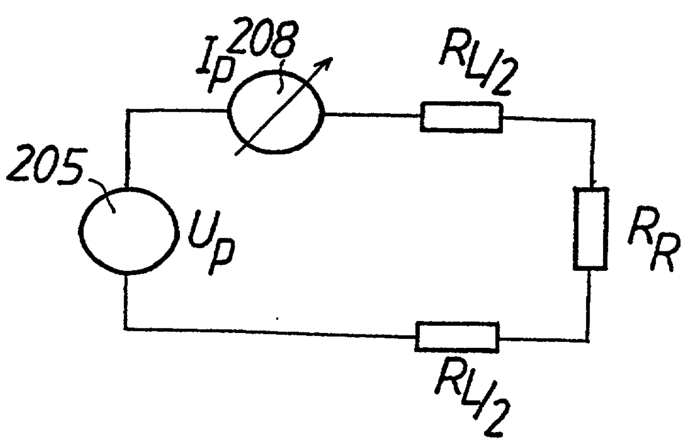
I_p 208
$R_{L/2}$
205
U_p
R_R
$R_{L/2}$

FIG.8

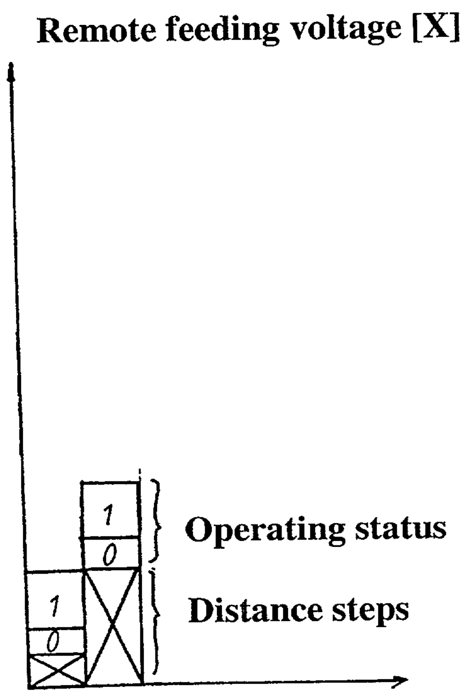
Remote feeding voltage [X]
1
0
1
0
Operating status
Distance steps

FIG.9